Serfojee Rajah. 1827

GENERAL ZOOLOGY

or

SYSTEMATIC NATURAL HISTORY

by

GEORGE SHAW, M.D. F.R.S &c.

WITH PLATES

from the first Authorities and most select specimens

Engraved by

M^r^. HEATH & M^rs^. GRIFFITH.

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INSECTA.

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INSECTS.

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Directions for placing the Plates in vol. VI. part I.

The Vignette represents a highly singular and beautiful insect called *Scarabæus Macropus* or Kangaroo Beetle. Its colour on the upper surface is a rich varnishy grass-green, and the under surface of a brilliant copper-colour. This singular Beetle was received from Potosi, and is preserved in the elegant collection of Mr. Francillon of Norfolk-street. The specimen is believed to be unique.

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ADVERTISEMENT.

The present volume is intended as an Illustration of the Linnæan genera of Insects, with the history of the principal species.

*** *The seventh and succeeding Volumes of this Work will proceed with all reasonable expedition.*

ERRATA.—VOL. VI. PART I.

P. 153, line 2, dele *the*.

P. 165, line 16, for *acantharis* read *acanthurus*.

ERRATA.—VOL. VI. PART II.

P. 378, line 9, *according to more or less*, read *according to the more or less*.

P. 379, line 13, for *in this division*, read *in this first division*.

P. 146, line 9, for *affirm*, read *affirms*.

INSECTS.

THE class of beings distinguished by the title of Insects, though far inferior in point of magnitude, must be confessed to surpass in variety of structure and singularity of appearance all the larger branches of the animal world. Their extraordinary shapes, the surprising beauty and diversity of their colours, and above all, the astonishing alteration of form which the generality of them undergo, conspire to constitute one of the most curious speculations which the science of natural history can exhibit, and may be said to realize all the fancied transformations recorded in the fictions of poetical romance.

The general characters by which Insects are distinguished from other animals are these. First, they are furnished with several feet: secondly, the muscles are affixed to the internal surface of the skin, which is of a substance more or less strong, and sometimes very hard and horny: thirdly, they breathe not in the usual manner of the generality of larger animals, by lungs or gills, situated in the upper part of the body, but by a sort of spiracles

or breathing-holes, distributed in a series or row on each side the whole length of the abdomen; and these spiracles or breathing-holes are supposed to communicate with a continued chain, as it were, of lungs, or at least of parts analogous to them, distributed throughout the whole length of the body. The head is furnished with a pair of what are termed *Antennæ* or horns, which are extremely various in the different tribes, and which, by their differences of structure form a leading character in the institution of the Genera or small assortments into which Insects are distributed.

Among the older writers on Natural History, and even among some of the more modern, several animals are called by the name of Insects, which, in reality belong to a very different tribe of beings, as Snails, several kinds of Worms, and the smaller animals in general. What are termed Animalcules in modern Natural History are also frequently confounded with insects, though in reality belonging to the very different tribe of Vermes or Worm-Like Animals.

It is not intended at present to enter, with any degree of minuteness, upon the anatomical description and philosophic history of Insects; since this has long ago been elucidated in almost all its branches by the labours of Swammerdam, Reaumur, Roesel, and many other authors: to relate therefore what has been so often described may be thought in a great degree unnecessary: yet, on the other hand, it may with equal propriety be observed, that few who have not been particularly

conversant in this part of Natural History can be supposed to have studied these authors; and to such it should seem highly necessary to give at least some abridged description of the particulars most worthy of attention which have been discovered by those who have written professedly on the subject.

It must be absolutely unnecessary in the present enlightened days of science to say any thing relative to the ancient idea of what was termed the equivocal production of Insects, and their supposed or pretended origin from putrefaction. One single experiment of Redi, a celebrated physician and philosophic observer in the seventeenth century, must be fully sufficient to prove the absurdity of the doctrine entertained by the ancients. Let some animal flesh, for instance, be placed in an open vessel, and exposed to the air for some days; and let another vessel with the same kind of flesh in it be also placed with it, but instead of being exposed to the air, let it be covered with a piece of silk or fine gauze, tied over it. The consequence will be, that the flesh in the open vessel will in a short time abound with the larvæ or maggots of flies, which have deposited their eggs on the meat; but, on opening the covered vessel, not the least appearance of such beings will be found, though the flesh be in the same state of putrefaction with the other. I know not that the truth of this experiment has ever been called in question; but if it has, it must have been owing to the experiment not having been properly con-

ducted; for, supposing the flesh not to be absolutely fresh or recent when first put into the vessel, it is by no means improbable that some animal's eggs might have been deposited upon it before the experiment was made; in which case they would undoubtedly hatch in the vessel, and thus lead to a fallacy. The flesh therefore must be perfectly fresh and well examined before it be put into the vessel. Still however an objection might be made on account of the legions of microscopic animalcules which would probably appear, if the fluid parts of the flesh, even in the closed vessel, were accurately surveyed*.

The ancients, exclusive of the former erroneous notion, entertained an idea that Insects were destitute of blood; for which reason they called them animalia exsanguia or bloodless animals; but this idea arose merely from their not having paid that minute attention to the study of Nature which distinguished the philosophers of the last and present century; and particularly to their not having had the advantage of the microscope. Insects are now well known to be so far from bloodless animals that in many of them the circulation itself of the blood is most clearly and distinctly perceived. The blood of insects differs from that of the larger animals chiefly in colour, since in most insects it wants redness, being generally of a clear or watery

* We must also admit that some kinds of the cellular or hydatid tæniæ might have taken up their abode in the flesh, and these, to a person inconversant in Natural History, might appear an argument in favour of equivocal generation.

aspect, and sometimes green. The circulation of the blood is particularly conspicuous in Spiders, and in some species of Cimex or Bug, in which the vibrations and contractions of the arteries may also be distinctly observed*.

The first state in which Insects appear is that of an ovum or egg. This relates to the generality of Insects; for there are some few examples of viviparous Insects, as in the genus Aphis, Musca, &c. From the egg is hatched the insect in its second or caterpillar state, (though the term Caterpillar relates more particularly to the insects of one peculiar tribe.) This second state has been generally known by the name of *Eruca,* but Linnæus has changed it to that of *Larva,* considering it as a sort of masked form or disguise of the Insect in its complete state. The Larvæ or Caterpillars of insects differ very much from each other, according to the different tribes to which they belong. Those of the Butterfly and Moth tribe are generally and emphatically known by the name of Caterpillars, and are universally known. Those of the Beetle tribe, except such as inhabit the waters, are of a thick, clumsy form, and the abdomen is commonly of a heavy or bulging appearance. The Larvæ of the Locust or Grasshopper tribe, and of some others of the same order, do not differ much in appearance from the complete Insect, except in being destitute of wings. The Larvæ of Flies, Bees, and many others, are gene-

* Especially in the Cimex lectularius or common bug.

rally known by the name of maggots, and are of a thick and short form. Those of Dragon-Flies, Dytisci or Water-Beetles, and many other Insects, are of highly singular forms, and differ perhaps more from that of the complete insect than any others except those of the Butterfly tribe.

Some Insects undergo no change of shape, but are hatched from the egg complete in all their parts, and undergo no farther alteration than that of casting their skin from time to time, till at length they acquire the complete resemblance of the parent animal.

It is in the Larva or caterpillar state that most insects are peculiarly voracious, as in many of the common caterpillars of Moths and Butterflies. In their complete state some insects, as Butterflies for instance, are satisfied with the lightest and most delicate nutriment, while others, as several Beetles, Dragon-Flies, &c. &c. devour animal and vegetable substances with a considerable degree of avidity.

When the time arrives in which the Larva or caterpillar is to change into the next state, viz. that of Chrysalis or *Pupa*, it ceases to feed, and having placed itself in some quiet situation for the purpose, lies still for several hours, and then by a kind of laborious effort, frequently repeated, divests itself of its external skin, or larva coat, and immediately appears in the very different form of a chrysalis or pupa.

The Pupa, or Chrysalis, differs in the different tribes of Insects almost as much as the Larva. In

most of the Beetle tribe it is furnished with short legs, capable of some degree of motion, though very rarely exerted. In the Butterfly tribe it is perfectly destitute of all appearance of legs, and has no other motion than a mere lateral bending or writhing when touched. In the Locust tribe it differs but very little from the perfect Insect, except in not having the wings complete. In most of the Fly tribe it is perfectly oval, without any apparent motion, or distinction of parts. The Pupæ of the Bee tribe, and other Insects of a similar cast are less shapeless than those of Flies, exhibiting the faint or imperfect appearance of the limbs. Those of the Libellulæ or Dragon-Flies are locomotive, as in the Locust tribe, but differ most widely from the appearance of the complete Insect, and may be numbered among the most singular in the whole class of Insects. I should here observe that the Linnæan term *Pupa*, which most modern entomologists substitute for that of Chrysalis, was given from the indistinct resemblance which many insects bear in this state to a doll, or a child when swathed up according to the old fashion.

From the Pupa or Chrysalis emerges at length the Insect in its complete or ultimate form; from which it can never change, nor can it receive any further increase of growth. This last or perfect state of an Insect is, in the Linnæan language, termed *Imago*.

This surprizing alteration of shape during the different periods of an Insect's life, is to be con-

sidered as an evolution or successive display of parts before concealed. Thus Swammerdam declares that he could demonstrate all the parts of the future Butterfly even in the body of the caterpillar itself. The truth of this experiment of Swammerdam has been sometimes vehemently doubted, and even denied by some; especially as it is difficult, at first, to discover these parts even in the chrysalis or pupa, which is a step nearer to the complete Insect. But in reality, there seems to be but small reason for questioning the truth of Swammerdam's observation; and it may be readily conceived that, by a very accurate and delicate investigation, the rudiments of the future fly may be distinguished in the Caterpillar, if observed a few hours before its transformation into a chrysalis.

Insects possess some particular parts which are not to be found in any of the larger animals. Among these are the *Antennæ* before mentioned, which are generally termed the horns. They are those processes or jointed bodies situated on each side the head. The use of these parts is not entirely understood*. It has by some been imagined that they are the instruments of hearing. They differ extremely in the different tribes of Insects, and are found to constitute one of the most convenient parts to fix upon in the distribution of Insects into genera and species. It is

* See a highly learned and ingenious dissertation entitled, "*De Sensibus externis Animalium Exanguium,*" by Mr. M. C. Gottlieb Lehman, published at Gottingen in the year 1798.

therefore necessary slightly to enumerate their differences.

Antenna setacea, or setaceous Antenna, means one which is shaped like a bristle, or which grows extremely fine and sharp at its termination.

Antenna filiformis, or thread-shaped, differs from the former in being of equal diameter throughout, or not visibly smaller at the tip than in other parts.

Antenna moniliformis, or moniliform, is that in which the joints are shaped like the beads of a necklace, each joint being globular or nearly so.

Antenna clavata, clavated or club-shaped, is one which thickens at the tip into a knob or small club, as in the major part of Butterflies.

Antenna fissilis, or fissile, is one which is split or divided at the tip into several lamellæ or flat separations, as in the Beetles strictly so called, or Scarabæi.

Antenna pectinata, or pectinated, means one which is divided along each side into numerous processes in such a manner as to resemble the teeth of a comb, as may be observed in many of the Moth tribe.

Antenna barbata, or bearded, is one which is slightly feathered, either on one or both sides, with fine lateral fibres or hairs.

Antenna perfoliata, or perfoliate, is one in which the joints are of a flattened and circular shape, with the stem or body of the antenna passing through them, as in the leaves of some plants, which are called perfoliate from a similar circum-

stance, viz. the stem seeming to pass through the leaves. This kind of Antenna is exemplified in some of the shell-winged or Beetle tribe.

Another part peculiar to Insects consists in a pair or two of short, jointed processes proceeding from the mouth: they are termed Palpi or Feelers, and are very conspicuous in some insects, and much less so in others.

The Mouth in insects is generally situated at the lower part of the front, and varies much in structure in the different orders. In the Beetle tribe it is furnished with very strong jaws, often notched or serrated on the inner side into the appearance of teeth: this is also the case in Locusts and many other insects. In some the mouth consists of a tube or instrument for suction, either simple, or variously sheathed and guarded by different kinds of appendages. In such insects as have jaws, it is observable that they do not meet perpendicularly, as in quadrupeds and birds, but horizontally.

So great is the variety in the structure of the mouth in the different tribes of Insects, that a celebrated Entomologist (Fabricius,) has formed his System from this part in preference to any other. It must be observed however, that this mode of arranging insects is attended with much difficulty, and seems far inferior to the obvious and easy characters which distinguish the Linnæan distribution.

The Eyes in Insects are commonly situated on each side the head, and are two in number; but

in some insects, as in Spiders, they are six or eight in number. In the major part of the Insect tribe the eyes may be considered as compound; at least with respect to the exterior coat or cornea, which, when viewed with a microscope, presents the appearance of an infinite number of separate convexities, which are of a shape exactly hexagonal, and appear to be so many real convex lenses or glasses; but the exact manner in which vision is performed in Insects is perhaps not yet ascertained. Some have supposed each of the hexagonal lenses to act as a real and separate eye, and that the optic nerves are expanded in separate branches at the bottom of each as a retina; or that one universal retina is expanded under all, which probably, is the real structure. Yet it still remains difficult to account for this prodigious multitude of eyes on the head of one single animal. The head of the common Libellula or Dragon-Fly is perhaps furnished with not less than twenty-five thousand of these little lenses. Whatever be their use, this particular structure cannot be contemplated without the highest admiration, and constitutes one of the most curious particulars in the comparative anatomy of Insects. That they are real convex lenses seems demonstrated by their exhibiting every phenomenon of such; inverting any object viewed through them when magnified, as the flame of a candle, the chimney of a house, or any other object towards which they are directed; and that they are double-convex lenses has been generally

concluded from the appearance of a lateral section of the cornea, in which the convexities of the sides of each lens have appeared similar*. The celebrated Swammerdam is of opinion that vision is not performed by each lens as a separate eye, as in quadrupeds, &c. but that it is excited, as he expresses himself, by the mere appulse of the rays of light on the lenses, which thus convey the idea of the object. He also observes, that under every lens is a hexagonal cone of fibres, the base of the cone corresponding to the size of each lens. Dr. Hook maintains that each lens is convex on the external, and concave on the internal side.

Besides the eyes just described, there are on the heads of many Insects three small, smooth, lucid globules resembling so many separate eyes, placed on the top of the head, between or above the lateral ones. These parts Linnæus distinguishes by the title of *Stemmata*. Their real nature is not yet very clearly understood.

The existence of the Brain in insects is denied by Linnæus, but by this he can only be supposed to mean that it does not bear much resemblance to that of the larger animals.

* Some insist that they are so many magnifying *Menisci* of unequal spheres, the exterior or convex part of each being a portion of a smaller sphere than the concave or interior part. The accurate Roesel represents the supposed convexity of both sides, but candidly confesses that he cannot absolutely determine the point. The late eminent optician Mr. Benjamin Martin, in an ingenious treatise on the nature of vision in Insects, insists on their being double convex lenses, and has represented the proportional convexity in the eye of the Dragon-Fly.

The Body in the major part of Insects is divided into the thorax or upper part, and the abdomen or lower part. In many of the Beetle tribe the back of the thorax is distinguished by a small triangular piece or division, situated at its lower part, between the juncture of the wing-sheaths: this triangular part is termed *Scutellum* or escutcheon. The under part of the thorax is called the breast, or *Pectus,* and in this the sternum is frequently distinguishable. The abdomen is marked into transverse sections, and the last joint terminates in the tail, or pointed extremity. The wing-sheaths or shelly coverings, in the Beetle tribe and some others, are termed *Elytra* or Coleoptra.

The Limbs, in the major part of Insects, consist of three principal divisions; viz. the upper joint, *Femur* or thigh, the second joint, *Tibia* or leg, and the third, *Tarsus* or foot, which commonly consists of several small articulations, and is terminated by a dilated tip, with two hooked claws.

In many Insects there are two small parts resembling minute bladders, fixed on a slender, short stem, and situated one under each wing: these parts are called *Halteres*, balancers, or poisers, and are only to be found in the two-winged insects: their supposed use is to keep the Insect steady during its flight, since if one of them be cut off, the animal flies with an unsteady motion.

The majority of Insects are observed to be annual; finishing the whole term of their lives in the space of a year or less; and many do not live

half that time; nay there are some which do not survive many hours; but this latter period is to be understood only of the animals when in their complete or ultimate form, for the larvæ of such as are of this short duration have in reality lived a very long time under water, of which they are natives; and it is observed that water-insects in general are of longer duration than land-insects. Some few insects however in their complete state are supposed to live a considerable time, as Bees for instance; and it is well known that some of the Butterfly tribe, though the major part perish before winter, will yet survive that season in a state of torpidity, and again appear and fly abroad in the suceeding spring. Spiders are also said to live a considerable time, and some species of the genus Cancer are said to live several years, especially the common Lobster, &c. It should be observed however that these animals, in the opinion of some modern naturalists, constitute a different tribe of beings from Insects properly so called.

I must not dismiss this slight introduction to the survey of Insects without observing that this branch of Natural History has above all others been subject to the ridicule which has so frequently been bestowed on the investigation of that science in general. Even those who from their superior genius and talents might have been supposed to have held every branch of science in its proper degree of estimation, have occasion-

ally given way to a temporary sally of contempt at the historians of the minuter productions of Nature. Thus the celebrated Count de Buffon, happening not to have had any particular addiction to the study of Insects, has not scrupled to hint in strong and striking terms his opinion of its inferiority compared with the study of the greater and more conspicuous parts of the creation. "Who," says this celebrated writer, "gives us the grandest and most magnificent ideas of the Creator of the Universe? he who represents him, in the plenitude of his power, directing the formation of suns and of planets, and guiding the revolutions of worlds, or he who discovers him busied in regulating the œconomy of an hive of bees, or deeply engaged in folding the wings of a beetle?"

Other philosophers however, of the most exalted character, have expressed a widely different opinion. The great Boyle declares that for his own part his wonder was more excited by the contemplation of a mite than by that of an elephant; and adds, in a phrase somewhat singular, that his admiration dwelt not so much on the clocks as on the watches of Nature; and the opinion of Pliny, which Linnæus takes for the motto of his volume on Insects is evident from his own words. *In his tam parvis tamque fere nullis quæ ratio! quanta vis! quam inextricabilis perfectio!*

Insects are divided by Linnæus into seven orders or distributions. The first order is entitled *Coleoptera*, and contains all those insects whose wings are guarded by a pair of strong, horny, exterior cases or coverings, under which the wings are folded up when at rest. These insects, in common language, are called Beetles, though in reality that term, as we shall soon find, is to be restricted in science to one particular genus. The wing-sheaths or horny coverings are sometimes called *coleoptra*, but more generally *elytra*. The Coleopterous Insects form a very large or extensive order.

The second division of Insects is termed *Hemiptera* or half-winged. That is, the upper part of the wing-sheaths in this tribe is of a tough or leathery texture, and the lower part membranaceous. Sometimes almost the whole wing-cover is leathery, but of a softer texture than in the Coleoptera. The insects contained in this division are very various; all the Locusts or Grasshoppers, the Cicadæ, and a great many others. It is to be observed that the wing-covers in this order cross each other when closed, instead of meeting in a direct line.

The third order is termed *Lepidoptera* or scaly-winged. It consists of the insects commonly termed Butterflies and Moths. The powder on the wings of these insects has been generally described by microscopical writers as consisting of small feathers; but in reality it consists rather of

minute scales, of various shapes and sizes on the different species, and even on the different parts of the same animal. Their general appearance is more or less fan-shaped, and they are disposed in the manner of tiles on a roof, lapping over each other.

The fourth order is called *Neuroptera*, or nerve-winged. The insects of this order are remarkable for the reticulated appearance of the wings, the fibres running into ramifications and decussations over the whole surface. This order is exemplified in the Libellulæ or Dragon-Flies, &c. in which this character is remarkably conspicuous: the wings are always four in number.

The fifth order is called *Hymenoptera*, and consists of insects furnished with four membranaceous wings, and also with a sting, or a process resembling one. It is exemplified in the well-known insects of the Bee and Wasp tribe and many others.

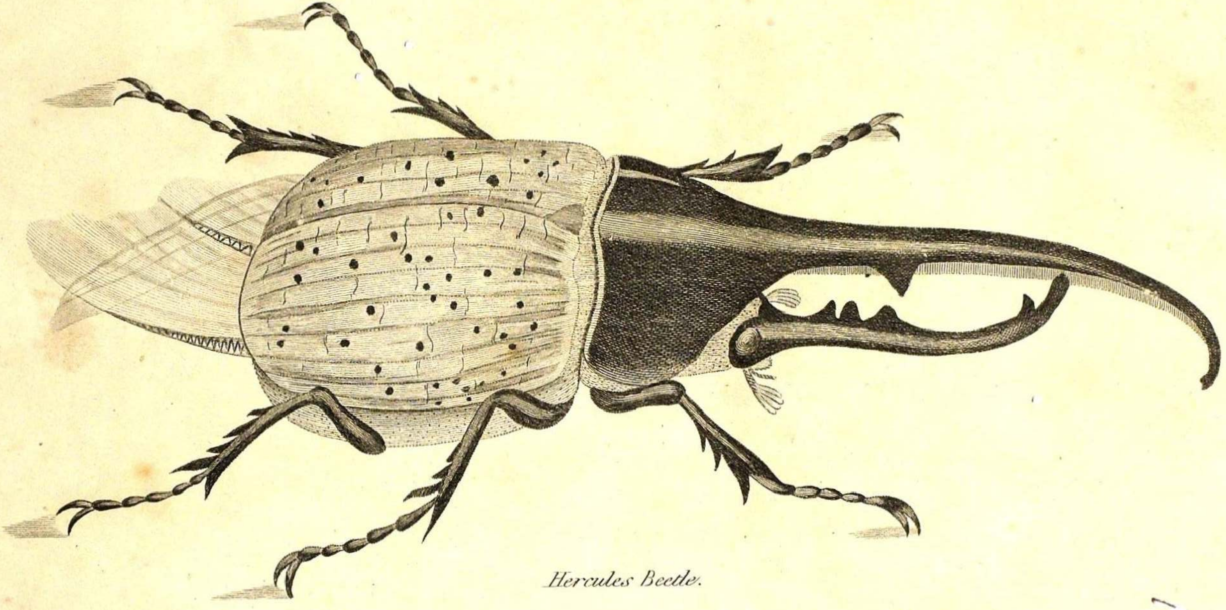
The sixth order is entitled *Diptera*, and contains such insects as are furnished with two wings only. In this order rank Flies, strictly so called, as well as Gnats, and a great variety of other insects.

The seventh and last order is termed *Aptera*; and consists of such insects as are totally destitute of wings, as Spiders, Centipedes or Scolopendræ, Fleas, and many others. To this order also belong the numerous species of the Crab and Lobster tribe, which by some naturalists are excluded from the class of Insects. It may be here observed, in order to prevent mistakes, that some of the Coleopterous Insects are destitute of wings, having

only the upper sheaths or elytra; yet by no means belong to the present order of Aptera. In some few species of Insects it will also be found that one sex is winged, while the other is apterous, as in some of the Moth tribe. The Aphides also, in the order Hemiptera, are known to have some individuals of the same species winged, and others wingless. These instances may sometimes mislead a beginning entomologist; but he will very soon learn to distinguish the real tribe to which the insect belongs, and will not hastily refer it to the Aptera.

SCARABÆUS.

7



Hercules Beetle.

M. Griffiths sculp.

1805. Oct. 1 London Published by G Kearsley Fleet Street.

INSECTS.

ORDER

COLOPTERA.

SCARABÆUS. BEETLE.

Generic Character.

Antennæ clavatæ, capitulo fissili.	*Antennæ* or horns clavate, with a fissile tip.
Tibiæ sæpius dentatæ.	*Legs* generally toothed.
Corpus crassum, compactum.	*Body* thick and compact.

THIS genus is extremely extensive. Among the most remarkable species is the *Scarabæus Hercules* or Hercules Beetle, which sometimes measures not less than five, or even six inches in length: the wing-shells are of a smooth surface, of a blueish or brownish grey colour, sometimes

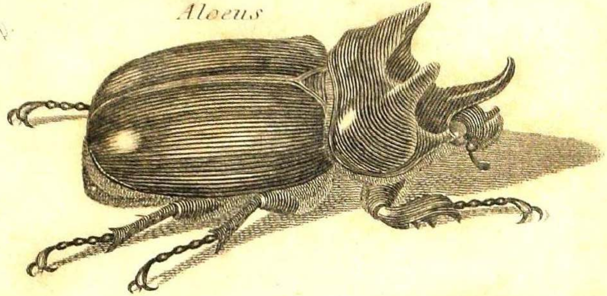
nearly black, and commonly marked with several small, round deep-black spots, of different sizes: the head and limbs are coal-black: from the upper part of the breast or thorax proceeds a horn or process of enormous length in proportion to the body: it is sharp at the tip, where it curves slightly downwards, and is marked beneath by two or three denticulations, and furnished throughout its whole length with a fine, short, velvet-like pile, of a brownish orange-colour: from the front of the head proceeds also a strong horn, about two thirds the length of the former, toothed on its upper surface but not furnished with any of the velvet-like pile which appears on the former. This species is a native of several parts of South America, where great numbers are said to be sometimes seen on the tree called the Mammæa*, rasping off the rind of the slender branches by working nimbly round them with the horns, till they cause the juice to flow, which they drink to intoxication, and thus fall senseless from the tree. This however, as the learned Fabricius has well observed, seems not very probable; since the thoracic horn, being bearded on its lower surface, would undoubtedly be made bare by this operation. This species, from the large size of all its parts, affords an admirable example of the characters of the genus. It varies much in size, and it may even be doubted whether some of the smaller specimens have not been occasionally re-

* Mammæa Americana. *Lin.* Mammee Tree. *Brown Jam.*

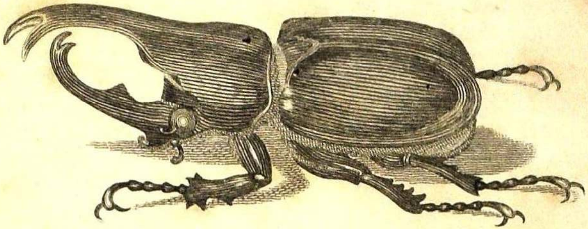
SCARABÆUS.

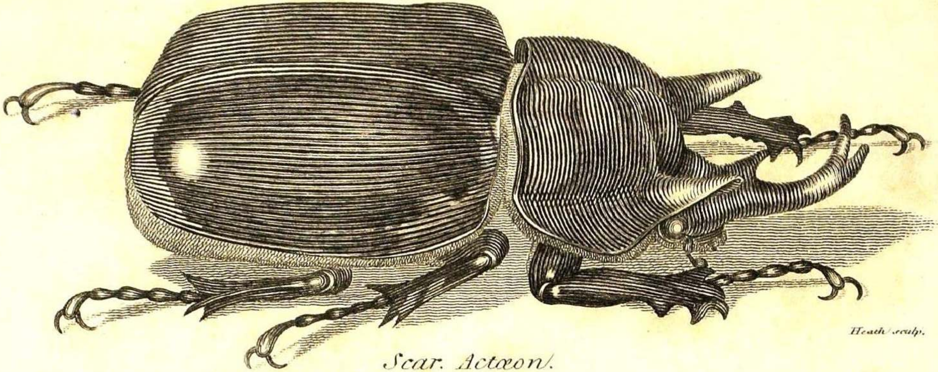
2

Aloeus



Gideon.



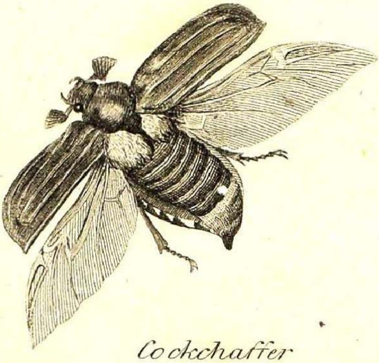


Heath sculp.

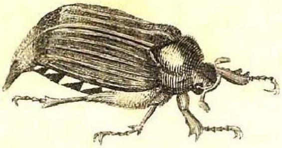
Scar. Actæon.

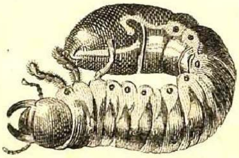
1805, Oct.r 1 London. Published by G. Kearsley Fleet Street.

SCARABÆUS.



Cockchaffer





Heath sculp.

1805, Oct. 1 London. Published by G. Kearsley, Fleet Street.

garded by authors as distinct species. The female is destitute both of the frontal and thoracic horn, but in other points resembles the male.

The Goliah Beetle, *Scarabæus Goliathus*, is highly remarkable both in point of size and colour: it is larger in body than the preceding, and has a rose-coloured thorax, marked with longitudinal black stripes or variegations, and purple-brown wing-sheaths: the head is divided in front into two forked processes: the limbs are black, and very strong. It is a native of some parts of Africa. A supposed variety sometimes occurs, in which both the thorax and wing-sheaths are of a pale yellowish brown instead of rose-colour, and are marked with black variegations.

One of the most common European Beetles is the Cockchaffer, or *Scarabæus Melolontha*. This insect is extremely familiar in our own island, the larva or caterpillar inhabiting ploughed lands, and feeding on the roots of corn, &c. and the complete insect making its appearance during the middle and the decline of summer. The Cockchaffer sometimes appears in such prodigious quantities as almost to strip the trees of their foliage, and to produce mischiefs nearly approaching to those of the Locust tribe. It appears from a paper by a Mr. Molineux, printed in the Philosophical Transactions for the year 1697, that some particular districts in Ireland were overrun by this insect in a wonderful manner. The account runs as follows. "These insects were first noticed in this kingdom in 1688. They appeared on the South-west coast

of Galway, brought thither by a south-west wind, one of the most common, I might almost say trade-winds, of this country. From hence they penetrated into the inland parts towards Hedd-ford, about twelve miles north of the town of Galway: here and there in the adjacent country multitudes of them appeared among the trees and hedges in the day-time, hanging by the boughs in clusters, like bees when they swarm. In this posture they continued, with little or no motion, during the heat of the sun; but towards evening or sunset they would all disperse and fly about with a strange humming noise like the beating of distant drums, and in such vast numbers that they darkened the air for the space of two or three miles square. Persons travelling on the roads, or abroad in the fields, found it very uneasy to make their way through them, they would so beat and knock themselves against their faces in their flight, and with such a force as to make the place smart, and leave a slight mark behind them. In a short time after their coming, they had so entirely eat up and destroyed all the leaves of the trees for some miles round, that the whole country, though in the middle of summer, was left as bare as in the depth of winter; and the noise they made in gnawing the leaves made a sound much resembling the sawing of timber. They also came into the gardens and destroyed the buds, blossoms, and leaves of all the fruit-trees, so that they were left perfectly naked; nay many that were more delicate than the rest, lost their sap as well as

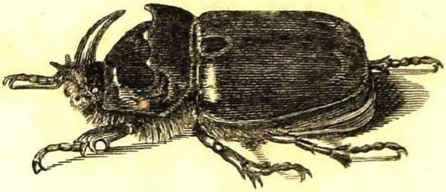
leaves, and quite withered away, so that they never recovered again. Their multitudes spread so exceedingly that they infested houses, and became extremely offensive and troublesome. Their numerous young, hatched from the eggs which they had lodged under ground, near the surface of the earth, did still more harm in that close retirement than all the flying swarms of their parents had done abroad; for this destructive brood, lying under ground, eat up the roots of corn and grass, and thus consumed the support both of man and beast. This plague was happily checked several ways. High winds and wet misling weather destroyed many millions of them in a day; and when this constitution of the air prevailed, they were so enfeebled that they would let go their hold, and drop to the ground from the branches, and so little a fall as this was sufficient quite to disable, and sometimes perfectly kill them. Nay it was observable that, even when they were most vigorous, a slight blow would for some time stun them, if not deprive them of life. During these unfavourable seasons of the weather, the swine and poultry of the country would watch under the trees for their falling, and feed and fatten upon them; and even the poorer sort of the country people, the country then labouring under a scarcity of provision, had a way of dressing them, and lived upon them as food. In a little time it was found that smoke was another thing very offensive to them, and by burning heath, fern, &c. the gardens were secured, or if the

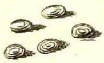
insects had already entered, they were thus driven out again. Towards the latter end of summer they returned of themselves, and so totally disappeared, that in a few days you could not see one left. A year or two ago, all along the South West Coast of the county of Galway, for some miles together, there were found dead on the shore such infinite multitudes of them, and in such vast heaps, that, by a moderate estimate, it was computed there could not be less than forty or fifty horse-loads in all; which was a new colony, or a supernumerary swarm from the same place whence the first stock came, in 1688, driven by the wind from their native land, which I conclude to be Normandy or Britany in France, it being a country much infested with this insect, and from whence England heretofore has been pestered in a similar manner with swarms of this vermin; but these, meeting with a contrary wind, before they could land, were stopped, and, tired with the voyage, were all driven into the sea, which, by the motion of its waves and tides, cast their floating bodies in heaps on the shore. It is observed that they seldom keep above a year together in a place, and their usual stages or marches are computed to be about six miles in a year. Hitherto their progress has been westerly, following the course of that wind which blows most commonly in this country."

It is recorded by Mouffet, in his History of Insects, that in the year 1574, in the month of February, so great a quantity of these insects

SCARABÆUS.

Scar: nasicornis.





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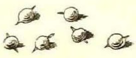
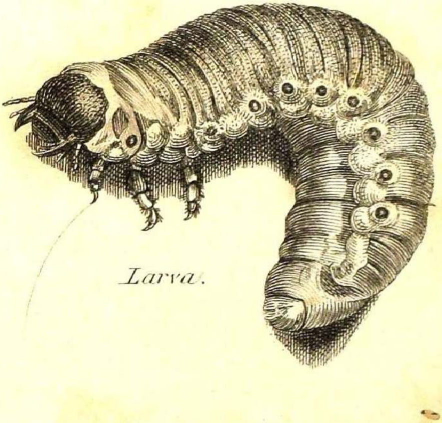
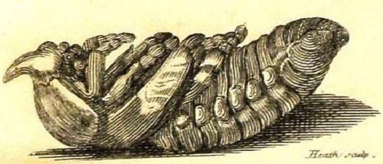




Larva.



Heath sculp.

Pupa

1805. Oct. 1 London. Published by G. Kearsley. Fleet Street.

were driven into the river Severn, that they totally prevented the mills from working, and were with difficulty extirpated by the united efforts of the people, and the various kinds of hawks, ducks, and other birds, which preyed upon them with avidity. In Normandy, according to the same author, they generally make their appearance every third year. In our own island the county of Norfolk seems occasionally to have suffered most from the ravages of the Cockchaffer. In the year 1751 in particular many crops are said to have been destroyed by it.

The larva or caterpillar of this insect is said to be two, and sometimes three years, in passing from its first form into that of the perfect insect. The eggs are laid in small detached heaps beneath the surface of some clod, and the young, when first hatched, are scarcely more than the eighth of an inch in length, gradually advancing in their growth, and occasionally shifting their skins, till they arrive at the length of near two inches. At this period they begin to prepare for their change into a chrysalis or pupa, selecting for the purpose some small clod of earth, in which they form an oval cavity, and, after a certain space, divest themselves of their last skin, and immediately appear in the chrysalis form, in which they continue till the succeeding summer, when the Beetle emerges from its retirement, and commits its depredations on the leaves of trees, &c. breeds, and deposits its eggs in a favourable situation, after which its life is of very short duration.

A much more elegant insect of this kind is the *Scarabæus Fullo* or Variegated Beetle. It is nearly twice the size of the Cockchaffer, and of an elegant chesnut-colour, with the wing-sheaths beautifully marbled with white variegations. It is common in many parts of Europe, but extremely rare in England.

A species of peculiar beauty is the Golden Beetle, *Scarabæus auratus*; it is about the size of the common or black garden beetle, but of a somewhat flatter shape; and of the most brilliant, varnished golden-green colour, with the wing-shells varied towards the lower part by a few slight, transverse, white streaks. This beautiful species is not uncommon during the hottest part of summer, frequenting various plants and flowers; its larva or caterpillar is commonly found in the hollows of old trees, or among the loose dry soil at their roots, and sometimes in the earth of ant-hills. It remains about three years before it changes to a pupa or chrysalis, out of which the insect emerges in a short times afterward.

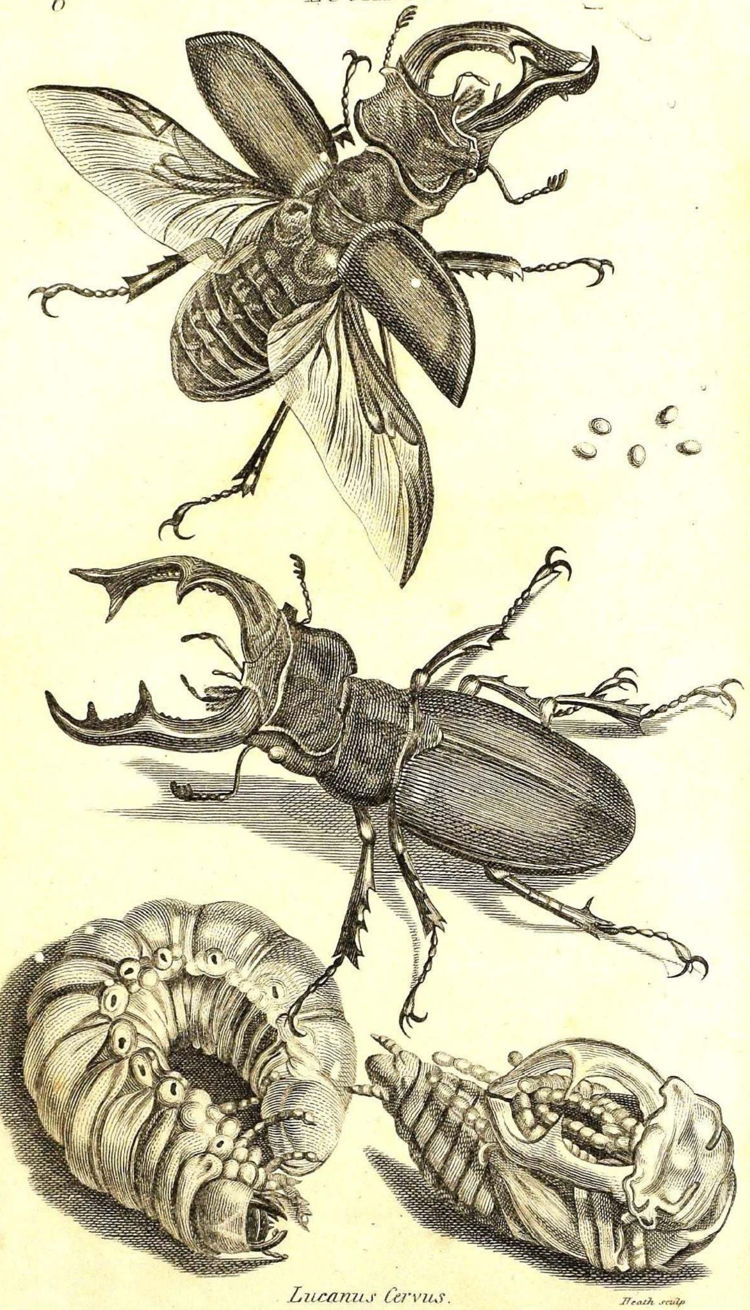
This may be sufficient for a general idea of the Linnæan genus *Scarabæus*. It may be added that the species are extremely numerous, and that so great is the singularity of appearance in many kinds, that even the most romantic imagination can hardly conceive a structure of horn or process which is not exemplified in some of the tribe.

SCARABÆUS.

Scar. Fullo.

M. Griffiths sculp.

1803, Octr. 1 London Published by G. Kearsley, Fleet Street.



Lucanus Cervus.

Heath sculp

1805. Octr. 1 London Published by G. Kearsley, Fleet Street

LUCANUS. STAG-CHAFFER.

Generic Character.

Antennæ clavatæ: clava compressa latere latiore pectinato-fissili.	*Antennæ* clavated, with compressed tip, divided into lamellæ on the inner side.
Maxillæ porrectæ, exsertæ, dentatæ.	*Jaws* stretched forwards, exserted, and toothed.

THIS genus, as the reader will perceive by attending to the generic character, differs chiefly from the preceding in having the jaws considerably elongated, so as to give the appearance of a pair of denticulated horns; while the antennæ terminate in a laterally-flattened tip, divided on the interior side into several lamellæ.

The principal species is the *Lucanus Cervus*, commonly known by the name of the Stag-Beetle, or Stagchaffer. It is the largest of all the European coleopterous insects, sometimes measuring near two inches and a half in length, from the tips of the jaws to the end of the body. Its general colour is a deep chesnut, with the thorax and head, which is of a squarish form, of a blacker cast: and the jaws are often of a brighter or redder chesnut-colour than the wing-shells: the legs

and under-parts are coal-black, and the wings, which, except during flight, are concealed under the shells, are large, and of a fine pale yellowish-brown. This remarkable insect is chiefly found in the neighbourhood of oak trees, delighting in the sweet exsudation or honey-dew so frequently observed on the leaves. Its larva, which perfectly resembles that of the genuine Beetles, is also found in the hollows of oak trees; residing in the fine vegetable mould usually seen in such cavities, and feeding on the softer parts of the decayed wood. It is of very considerable size, of a pale yellowish or whitish brown colour, and when stretched out at full length, measures nearly four inches*. Its general posture however is the curved one exhibited in the annexed plate. When arrived at its full size, which, according to some, is hardly sooner than the fifth or sixth year, it forms, by frequently turning itself, and moistening it with its glutinous saliva, a smooth oval hollow in the earth in which it lies, and afterwards remaining perfectly still for the space of near a month, divests itself of its skin, and commences pupa or chrysalis. It is now of a shorter form than before, of a rather

* It has been supposed by Roesel, and not without a considerable degree of probability, that these Larvæ were the Cossi of the ancient Romans, which, according to Pliny, were in high esteem as an article of luxury. What renders this supposition the more probable is that the larvæ of a species of Cerambyx, as well as of a Curculio, are well known to be greatly admired by the inhabitants of the West Indian islands, and are frequently collected at a great expence, as a highly delicate dish, being broiled or fried for that purpose.

deeper colour, and exhibits in a striking manner the rudiments of the large extended jaws and broad head so conspicuous in the perfect insect: the legs are also proportionally larger and longer than in the larva state. The ball of earth in which this chrysalis is contained is considerably larger than a hen's egg, and of a rough exterior surface, but perfectly smooth and polished within. The chrysalis lies about three months before it gives birth to the complete insect, which usually emerges in the months of July and August. The time however of this insect's growth and appearance in all its states varies much, according to the difference of seasons. It is not very uncommon in many parts of England.

The commonly supposed female differs so much in appearance from the male, that it has by some authors been considered as a distinct species. It is not only smaller than the former, but totally destitute of the long and large ramified jaws, instead of which it has a pair of very short curved ones, slightly denticulated on their inner side: the head is also of considerably smaller diameter than the thorax. In point of colour it resembles the former. Among those who consider it as a distinct species may be numbered the ingenious Mr. Marsham, F. L. S. who, in his Entomologia Britannica, assures us that the real female insect extremely resembles the male, but is smaller, and wants the larger denticulation on the inner side of each horn. The generally supposed female he distinguishes by the title of *Lucanus inermis. L.*

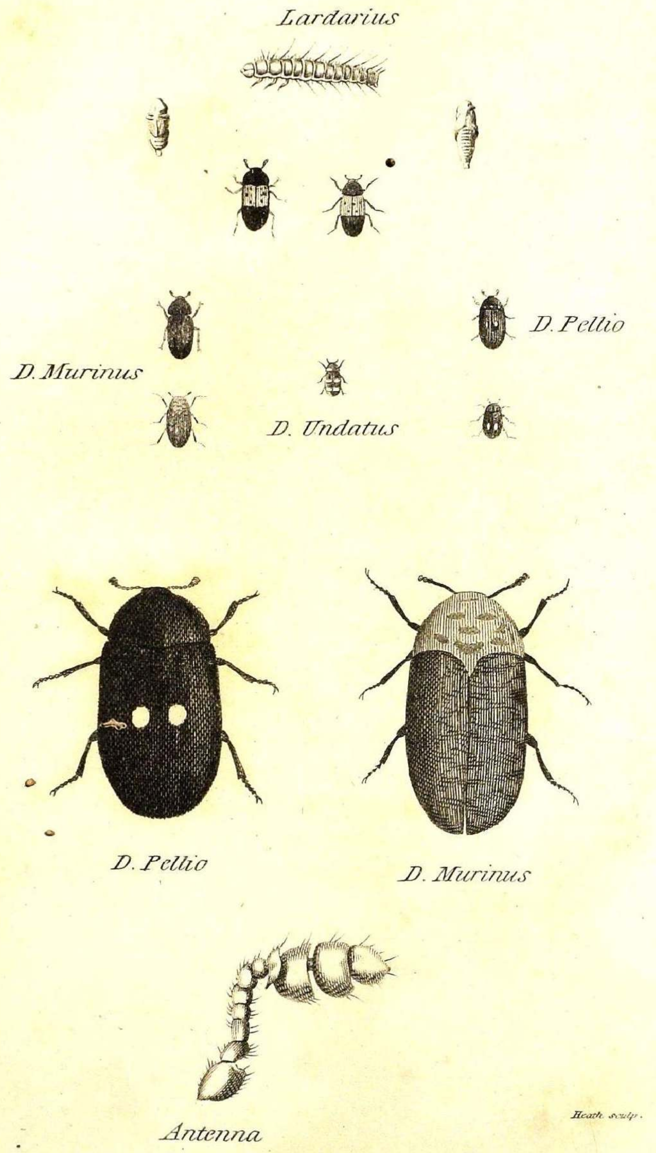
convexus brunneus; maxillis brevibus: dente laterali elevato.

The exotic species of this genus are mostly natives of America, and one in particular, frequently found in Virginia, is so nearly allied to the English Stag-Beetle as hardly to differ, except in having fewer denticulations or divisions on the jaws.

A highly elegant species has lately been discovered in New Holland. This differs from the rest in being entirely of a beautiful golden green colour, with short, sharp-pointed, denticulated jaws of a brilliant copper-colour. The whole length of the Insect is rather more than an inch.

7.

DERMESTER.



1805 Oct.1 London. Published by G. Kearsley Fleet Street.

DERMESTES. LEATHER-CHAFFER.

Generic Character.

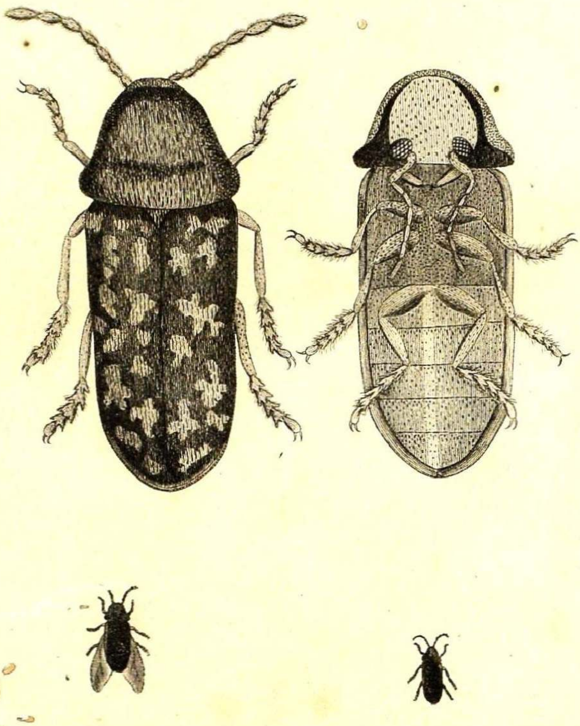
Antennæ clavatæ, capitulo perfoliato: articulis tribus crassioribus.	*Antennæ* clavated, with perfoliate tip, the three last joints being larger than the rest.
Thorax convexus, vix marginatus.	*Thorax* convex, scarce or very slightly margined.
Caput sub thorace inflexum condens.	*Head* withdrawn at pleasure beneath the thorax.

THIS genus consists chiefly of small insects. Their larvæ are found among skins, furs, and various animal substances, of a dry kind, which they gradually injure, and are numbered among the most destructive insects in Museums, devouring specimens of birds, quadrupeds, collections of dried plants, &c.: they are of a lengthened oval shape, and more or less hairy, especially towards the end of the body, where, in some, the hairs form a kind of spreading tuft, which the animal raises on being suddenly disturbed. The complete insects are mostly of a lengthened oval shape, and have a habit of withdrawing the head beneath the thorax when handled. One of the most familiar species is the *Dermestes lardarius*, which is about a third of an inch in length, and of a

dusky brown colour, with the upper half of the wing-shells whitish or ash-coloured, marked with black specks. The larva is often found about dried or salted meat, lard, &c. &c.

Another species, seen in almost every house during the early part of the spring and summer, is the *Dermestes Pellio.* It is smaller than the preceding, measuring scarcely a quarter of an inch in length, and is of a very dark brown or blackish colour, with a white speck on the middle of each wing-shell.

P. fatidicus magnified



Ptinus fatidicus

M. Griffiths sculp.

1805, Oct.r 1 London Published by G. Kearsley, Fleet Street.

PTINUS. PTINUS.

Generic Character.

Antennæ filiformes; articulis ultimis majoribus.
Thorax subrotundus, immarginatus, caput excipiens.

Antennæ filiform, with the three last joints largest.
Thorax roundish, without distinct margin, receiving occasionally the head.

THE genus Ptinus, like that of Dermestes, consists of small insects which, in general, have similar habits, living both in their larva and complete state among dry animal substances, and some species in dry wood, committing great havock among the older articles of furniture, which they pierce with innumerable holes, thus causing their gradual destruction.

To this genus belongs the celebrated Insect distinguished by the title of the Death-Watch, or *Ptinus fatidicus*. Among the popular superstitions which the almost general illumination of modern times has not been able to obliterate, the dread of the Death-Watch may well be considered as one of the most predominant, and still continues to disturb the habitations of rural tranquillity with groundless fears and absurd apprehensions. It is not indeed to be imagined that they who are en-

gaged in the more important cares of providing the immediate necessaries of life should have either leisure or inclination to investigate with philosophic exactness the causes of a particular sound: yet it must be allowed to be a very singular circumstance that an animal so common should not be more universally known, and the peculiar noise which it occasionally makes be more universally understood. It is chiefly in the advanced state of spring that this alarming little animal commences its sound, which is no other than the call or signal by which the male and female are led to each other, and which may be considered as analogous to the call of birds; though not owing to the voice of the insect, but to its beating on any hard substance with the shield or fore-part of its head. The prevailing number of distinct strokes which it beats is from seven to nine or eleven; which very circumstance may perhaps still add in some degree to the ominous character which it bears among the vulgar. These sounds or beats are given in pretty quick succession, and are repeated at uncertain intervals; and in old houses where the insects are numerous, may be heard at almost every hour of the day; especially if the weather be warm. The sound exactly resembles that which may be made by beating moderately hard with the nail on a table. The insect is of a colour so nearly resembling that of decayed wood, viz. an obscure greyish brown, that it may for a considerable time elude the search of the enquirer. It is about a quarter of

an inch in length, and is moderately thick in proportion, and the wing-shells are marked with numerous irregular variegations of a lighter or greyer cast than the ground-colour. In the twentieth and twenty-second volume of the Philosophical Transactions may be found a description of this species by the celebrated Derham, with some very just observations relative to its habits and general appearance; and it seems singular that so remarkable an insect should have almost escaped the notice of more modern entomologists. In the twelfth edition of the Systema Naturæ of Linnæus it does not appear; but is probably the *Dermestes tesselatus* of Fabricius, in which case he seems to have placed it in a wrong genus. Ridiculous, and even incredible as it may appear, it is an animal that may in some measure be tamed: at least it may be so far familiarized as to be made to beat occasionally, by taking it out of its confinement, and beating on a table or board, when it will readily answer the noise, and will continue to beat as often as required.

We must be careful not to confound this animal, which is the real Death-Watch of the vulgar, emphatically so called, with a much smaller insect of a very different genus, which makes a sound like the ticking of a watch, and continues it for a long time without intermission. It belongs to a totally different order, and is the Termes pulsatorium of Linnæus.

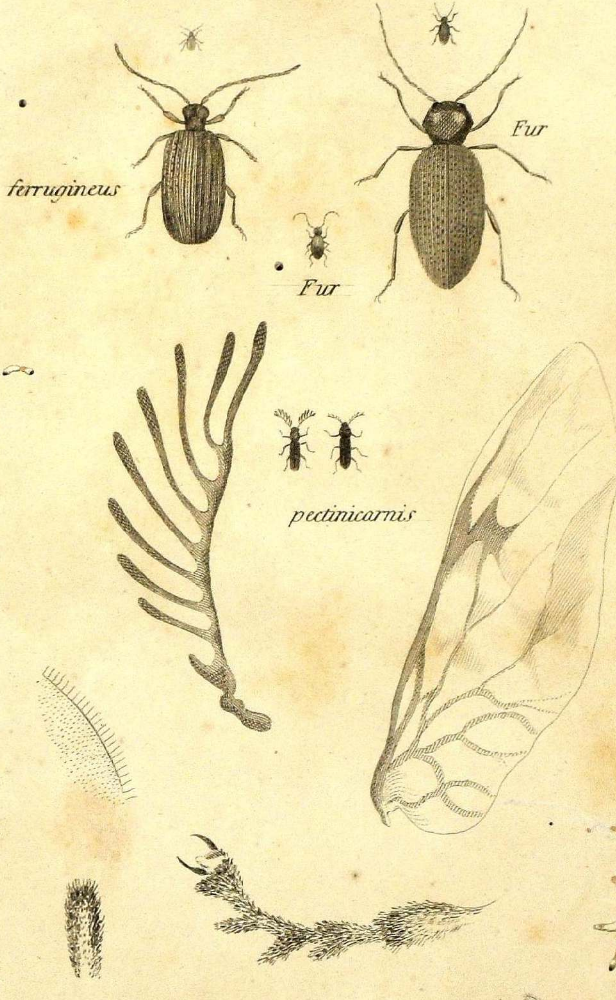
I cannot conclude this slight account of the Death-Watch without quoting a sentence from

that celebrated work the Pseudodoxia Epidemica of the learned Sir Thomas Brown, who on this subject expresses himself in words like these. "He that could eradicate this error from the minds of the people would save from many a cold sweat the meticulous heads of nurses and grandmothers*."

A very destructive little species of Ptinus is often seen in collections of dried plants, &c. &c. remarkable for the ravages it commits both in its larva and perfect state. The larva resembles that of a beetle in miniature, being about the eighth of an inch long, and of a thickish form, lying with the body bent, and is of a white colour. The perfect insect is very small, measuring only about the tenth of an inch, and is slender, of a pale yellowish chesnut colour, appearing, when magnified, beset with small short hairs, with the wing-covers finely striped by rows of small impressed points or dots. The ravages of the larva are most remarkable during the summer.

The *Ptinus Fur* of Linnæus is another very destructive species. Its length is somewhat more than the tenth of an inch, and its colour pale chesnut-brown, sometimes marked on the wing-covers by a pair of greyish bands: the antennæ are rather long and slender; the body remarkably convex, and the thorax, when magnified, appears

* The reader will perceive that I have repeated the history of the Death-Watch from the description which I long ago published in the Naturalist's Miscellany.



Head, leg, wing &c. of P. pectinicornis magnified.

Heath sculp.

1805 Oct.r 1 Published by G. Kearsley, Fleet Street London.

to have a projecting point on each side. Its larva resembles that of the preceding species, and is found in similar situations.

Ptinus pectinicornis is readily distinguished by the remarkable appearance of the antennæ, the longer joints of which are so deeply pectinated as to have the aspect of feathered antennæ. It is one of the smaller species, measuring in length about the eighth of an inch, and is of a slender habit, with a subcylindric body. It is often found in old wood, and among papers, books, &c. which it perforates and destroys.

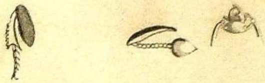
HISTER. HISTER.

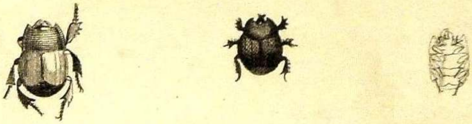
Generic Character.

Antennæ capitatæ capitulo solidiusculo; infimo articulo compresso, decurvato.	*Antennæ* headed by a somewhat solid tip; lowest joint compressed and decurved.
Caput intra corpus retractile. *Os* forcipatum.	*Head* retractile. *Mouth* forcipated.
Elytra corpore breviora.	*Wing-sheaths* shorter than the body.
Tibiæ anticæ dentatæ.	*Fore-legs* toothed.

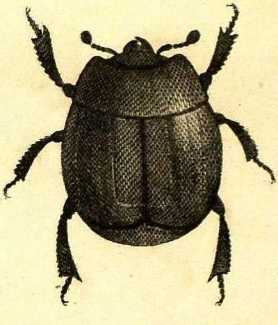
THE most common European species of this genus is the *Hister unicolor* of Linnæus. It is entirely of a glossy coal-black colour, and of a slightly flattened shape; varying considerably in size, but usually measuring about the third of an inch in length, and is often seen in gardens, sandy fields, &c. Its larva seems to be unknown.

Hister quadrimaculatus. Lin. has much the appearance of a small beetle; its shape is strongly convex, and its colour black, with two dull-red bars on each wing-shell; viz. one at the base, and the other, smaller, at the tip. It is found about dunghills, &c.





Hister unicolor



H.U. magnified

under side

Heath sculp

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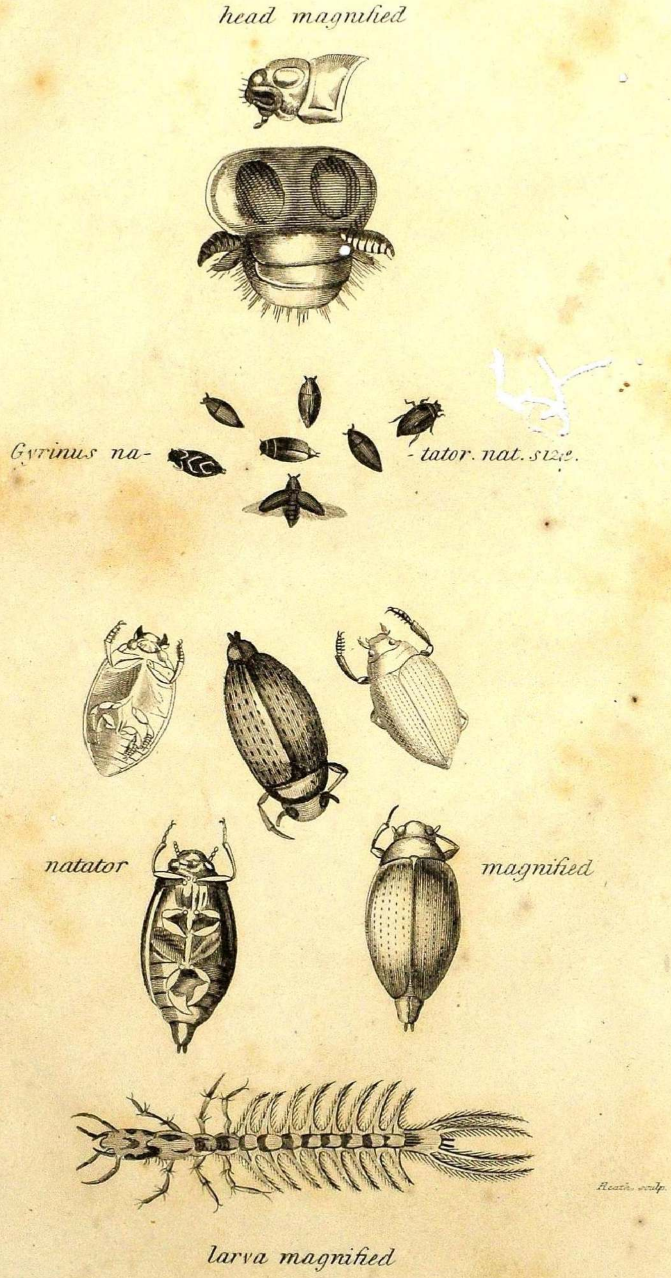
GYRINUS.



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GYRINUS. GLIMMERCHAFFER.

Generic Character.

Antennæ clavatæ, rigidæ, capite breviores.
Oculi quatuor; duobus supra, duobus infra.

Antennæ clavated, stiff, shorter than the head.
Eyes (apparently) four; two above, and two below.

THE genus Gyrinus is furnished with extremely short, stiff antennæ, appearing to consist of an undivided piece or joint; but, if accurately inspected by means of a magnifier, they will be found to be composed of very numerous close-set joints: the eyes are so placed as to appear double on each side the head; viz. one above and the other below the base of the antenna.

The most remarkable European species is the *Gyrinus natator*, a small Insect, about a quarter of an inch in length, of an oval shape, with somewhat sharpened extremities, and of a black or grey-black colour, with so lucid a surface as to shine like a piece of looking-glass in the full sunshine. It is an inhabitant of the waters, and is chiefly found in rivulets, being generally seen in great multitudes, and in very brisk motion. It is difficult to catch, diving with astonishing celerity when disturbed; the hinder legs being very broad,

finely webbed with minute hairs, and most curiously formed for exercising the office of fins or oars. The larva is of a highly singular aspect, having a very lengthened body, furnished, exclusive of six legs on the fore-parts, with a great many lateral appendages or processes down the body; those towards the extremity considerably exceeding the rest. In its motions it is extremely agile, swimming in a kind of serpentine manner, and preying on the smaller and weaker water-insects, minute worms, &c. the head is armed with a pair of forceps, pierced on each side the tip with a small foramen, through which it sucks the juices of the animals on which it preys: the colour of this larva is a very pale or whitish brown, with a high degree of transparency, which renders it a highly curious object for the microscope: its length, when full-grown, is about three quarters of an inch. When the time of its changes arrives, it forms for itself a small oval cell or case on a leaf of sedge or other convenient water-plant, and after casting its skin, becomes a chrysalis: this change usually takes place in the month of August, and the complete insect emerges in that of September.

When these animals are congregated together in great multitudes on the surface of the water, which frequently happens in hot weather, they have been observed to diffuse a strong or disagreeable smell to a considerable distance. Like other water-beetles, they fly only by night. They deposit their eggs, which are very small, white, and of a somewhat cylindric form, on the stems of

water-plants: they hatch in the space of about eight days, and immediately begin to swim about with much briskness in quest of prey.

Most of the exotic Gyrini have a strong general resemblance to this species, but differ in size and colour, though none hitherto discovered can be considered as large insects.

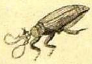
PAUSUS. PAUSUS.

Generic Character.

Antennæ biarticulatæ, clava maxima, uncinata, pedicellata, mobili.	*Antennæ* of two joints, the upper very large, inflated, moveable, and hooked.
Caput porrectum.	*Head* stretched forwards.
Elytra flexilia, deflexa, truncata.	*Wing-sheaths* flexile, deflected, truncated.

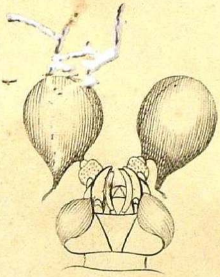
THIS genus does not exist in the twelfth edition of the Systema Naturæ, but made its first appearance in a dissertation published at Upsal by Linnæus, in the year 1775. At that period only one species was known. In the year 1796, Dr. Adam Afzelius, then residing at the British settlement at Sierra Leona, discovered a second, and has described both with elaborate exactness in a paper on this genus published in the fourth volume of the Transactions of the Linnæan Society of London. To this paper nothing can be objected but its extreme prolixity. I shall therefore take the liberty of here reducing it within reasonable compass. The etymology of the name Dr. Afzelius imagines to be from the Greek παυσις, signifying a pause, cessation, or rest; for Linnæus, now old and infirm, and sinking under the weight of

PAUSUS.

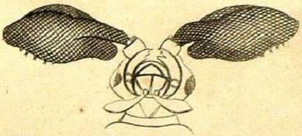


P. sphœroceros

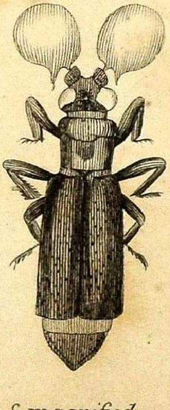
P. microcephalus



head magnified



head magnified



P. S. magnified

P. m. magnified

Heath sculp

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age and labour, saw no probability of continuing any longer his career of glory. He might therefore be supposed to say "*hic meta laborum*," as it in reality proved, at least with regard to Insects; Pausus being the last he ever described.

He named the Insect *Pausus microcephalus*. The head is uncommonly small; the thorax broader than the head, and very uneven, the two parts being entirely separated by a transverse furrow; the foremost division is elevated into a sharp ridge resembling a collar, and the hindmost is depressed or cut out in the middle into a cavity, which is obtuse behind, dilated and deepened before, and encompassed on the sides with diverging and outwardly declining lobes, being rounded at the top, and provided with shining hairs of a fulvous colour and bent inwards: the elytra are without dots, and rather longer than the abdomen: the under or real wings are sooty, and without the least glossiness: the abdomen has the terminal segment very retuse, and the margin of the next before it is visibly raised, the pivots of the antennæ are black, very bright, and at first sight might be easily taken for eyes; the under joint is furnished with a wart on the inner margin of the top, covered with papillary or cartilaginous hairs: the upper joint or clava is dotted, much larger than the head, and of the shape of an oblong spheroid, being rounded in front and compressed, with the carina raised into a sharp edge, provided on the vertex with four tubercles set in a row and tipped with hairs, and elongated behind into an obtuse tube,

laterally compressed, above depressed and underneath having a knob, which, in moving, touches the bundle of hairs on the top of the under joint: the pedicle is long and crooked, its upper part being broader, compressed, and keeled in front: the interior palpi are of a lanceolate-oblong shape, and furnished with very minute hinges: the mandibles have small hinges, and the inferior sheath is much larger than the superior: the hind-legs are a little shorter than the others: the joints of the tarsi are difficultly distinguished. This rare insect is a native of Banana island, and Sierra Leona in Africa. Its colour is a blackish brown. It is represented on the annexed plate both in its natural size, and considerably magnified.

The second species, or *Pausus sphærocerus*, is thus described by Dr. Afzelius.

"I had been in Africa almost three years before I happened to meet with this remarkable little insect; and then it was quite accidentally. There was a house building for the Governor, on an eminence called Thornton Hill at the South end of Free-Town in Sierra Leona; and in the beginning of the year 1795, several apartments having been got ready, so as to be habitable, one of them was allotted to me, and I removed into it in the end of the month of January. I had not resided there many days, when one evening, having just lighted my candle and begun to write, I observed something dropping down from the ceiling before me upon the table; which, from its singular appearance, attracted my particular attention. It

remained for a little while quite immoveable, as if stunned or frightened, but began soon to crawl very slowly and steadily. I then caught it, and, from the remembrance I had of the Linnæan species, I directly took it for a non-descript of this genus. Some few days after, coming into my room from supper, with a light in my hand, and having put it upon the table, there instantly fell another down from the ceiling. The third I was favoured with by the then Governor, Mr. Dawes, who informed me that it had dropped down before him on the table, just when he had entered his room, and was going to write. The other three, which I afterwards collected, were also got upon similar occasions, and from thence I thought I had some reason to conclude that it is a nocturnal animal, that it becomes benumbed by candle-light, that it lives in wood, and prefers new-built houses, &c. After the end of February I never saw any more. The last which I caught I put into a box, and left confined there for a day or two. One evening, going to look at it, and happening to stand between the light and the box, so that my shadow fell upon the insect, I observed to my great astonishment, the globes of the antennæ, like two lanthorns, spreading a dim phosphoric light. This singular phenomenon raised my curiosity, and, after having examined it several times that night, I resolved to repeat my researches the following day. But the animal, being exhausted, died before the morning, and the light disappeared. And afterwards, not being

able to find any more specimens, I was prevented from ascertaining the fact by reiterated experiments at different times; which I therefore must recommend to other naturalists who may have an opportunity of visiting Sierra Leona, requesting that they would particularly inquire into this curious circumstance. I shall now only add some few remarks, shewing in what manner this new species differs from the old one. Not being quite so broad, it looks as if it were longer, and more cylindrical: it is also of a lighter or chesnut colour, and all over very glossy. The head is larger, but its annular base part smaller, and contracted: it is furnished with a little horn in the middle, between the eyes, which is strait, conic, and tipped with a tuft of cartilaginous hairs: the clypeus is only depressed, and the jugular triangle wider: the eyes are large, and very evident, those of the male black, though in a certain light appearing greenish; but those of the female are like pearls, or as if they were covered with a crystalline membrane: the angles of the brim of the socket are small and rounded at the top, and the hinder one lower than the eye. The pivots of the antennæ are not so discernible as in the former species, being like the surrounding parts in colour: the under joint is without any hairy papilla or wart: the upper joint or clava is of the size of the head, quite globular, and resembles an inflated bladder, being almost pellucid, and of a light flesh-colour: the keel is nothing more than a raised line, finishing on the vertex in only one chesnut-brown

tubercle covered with cartilaginous hairs: behind there is a little conical shining hook, of the same colour and with the same sort of hairs bending outwardly, being of equal length with the horn on the head, but narrower: the pedicle is short, strait, and cylindrical. The interior palpi, furnished with very visible hinges, are a little thicker towards the top, but look in some directions as if they were filiform: the mandibles have large hinges, and the superior sheath almost as long as the inferior one, and nearly cylindrical. The thorax is of the same breadth with the head, and not very uneven, the two parts being separated by a furrow only on the sides and underneath, the foremost above and on the sides resembling an annular segment, and the hinder one impressed in the middle with a mark somewhat like two small diverging wings of a blackish silvery colour. The elytra are shorter than the abdomen, and minutely punctated: the under wings are of a shining and changeable violaceous colour, and not very dark: the abdomen has the terminal segment a little convex, and in the female more so than in the male: underneath, the third and last segments are darker than the others, the legs are all of equal length; the tarsi longer than those of the Pausus microcephalus, and have both the joints and the claws much more distinct."

BYRRHUS. BYRRHUS.

Generic Character.

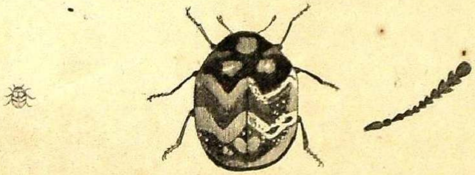
Antennæ clavatæ, subsolidæ, subcompressæ.	*Antennæ* clavated, subsolid, subcompressed.

THE Insects belonging to this genus have an ovate body, convex or subglobular in some species, with the wing-shells covered by a short pile, and the head is retracted under the thorax.

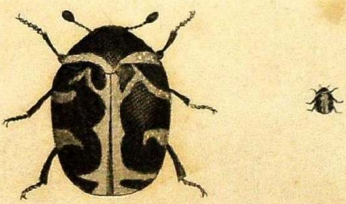
The *Byrrhus Scrophulariæ* is a small insect, of the size of one of the smallest kind of Coccinellæ or Lady-Birds; its colour is a dark brown, clouded with broken or irregular white bands, and the edges constituting the line of division between the wing-sheaths is red. This little insect is observed to be more frequently found on the plant called Scrophularia aquatica than elsewhere.

Byrrhus Pilula is a larger species, equalling, or rather exceeding the size of the common Lady-Bird or Coccinella septem-punctata. Its colour is a dull brown, with a few obscure blackish lines down the wing-shells: it is of an extremely convex shape, and, when disturbed, contracts its limbs, and lies in an inert state, resembling the appearance of a seed or pill. It is found on various plants, and about garden-ground, &c. the antennæ

Pilula



Musæorum



Heath sculp.

Scrophulariæ

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in this species are longer than in others, and rather perfoliated than merely knobbed.

Byrrhus Museorum resembles Byrrhus Scrophulariæ, but wants the red suture of the wing-shells: it is often seen in houses, and commits depredations in animal and vegetable collections, in the same manner as the insects of the genus Ptinus and Dermestes.

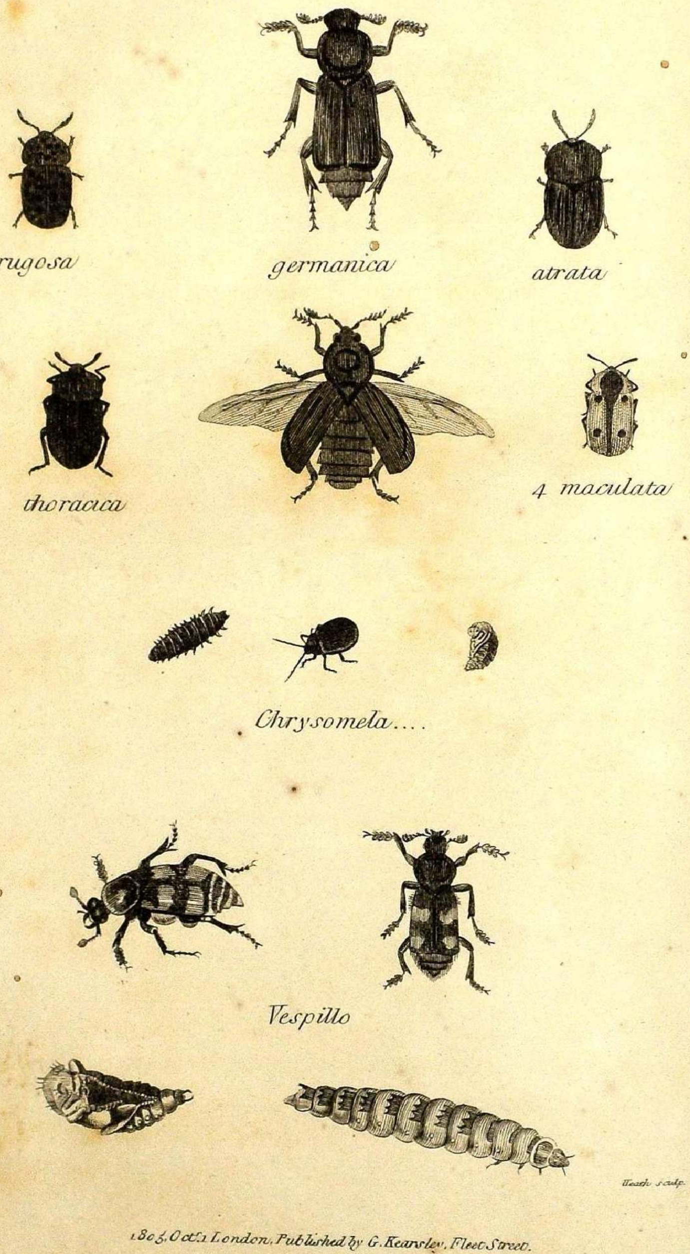
SILPHA. SILPHA.

Generic Character.

Antennæ extrorsum crassiores.	*Antennæ* thickening towards the tip.
Elytra marginata.	*Wing-sheaths* margined.
Caput prominens.	*Head* prominent.
Thorax planiusculus, marginatus.	*Thorax* flattish, margined.

THE insects of the genus Silpha are generally found among decaying animal or vegetable substances, frequenting dung-hills, carrion, &c. and deposit their eggs chiefly in the latter. The Larvæ are of a lengthened shape, and of an unpleasant appearance, being generally roughened with minute spines and protuberances. The most remarkable of the European species, and which is by no means uncommon in our own country, is the *Silpha Vespillo*, distinguished by having the wing-sheaths considerably shorter than the abdomen, or as if cut off at the tips: they are also each marked by two waved, orange-coloured, transverse bars, the rest of the insect being black: the general length of the animal is about three quarters of an inch. This insect seeks out some decaying animal substance in which it may deposit

SILPHA.



Heath sculp.

1805, Oct.r 1 London. Published by G. Kearsley, Fleet Street.

its eggs, and in order to their greater security, contrives to bury it under ground. Three or four insects, working in concert, have been known to drag under the surface the body of so large an animal as a Mole in the space of an hour, so that no trace of it has appeared above ground. The eggs deposited by the parent insects are white, and of an oval or rather subcylindric shape: from these are hatched the Larvæ, which, when full-grown, are more than an inch in length, and of a yellowish-white colour, with a scaly orange-coloured shield or bar across the middle of each division of the body. Each of these larvæ forms for itself an oval cell in the ground, in which it changes to a yellowish chrysalis, resembling that of a beetle; out of which, in the space of about eighteen days, proceeds the perfect insect. This species possesses a considerable degree of elegance, but generally diffuses a very strong and unpleasant smell: it flies with considerable strength and rapidity, and is generally seen on the wing during the hottest part of the day. In many parts of North America is found a variety, differing merely in size, being far larger than the European kind, and measuring an inch and half in length.

The *Silpha Germanica* of Linnæus so much resembles the S. Vespillo that it seems scarcely to differ except in colour, being entirely coal-black. It is found in similar situations with the preceding species.

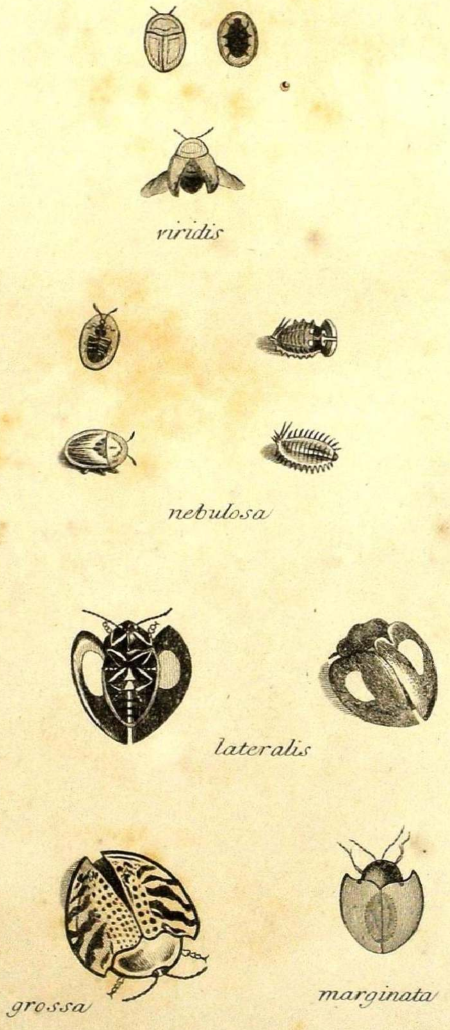
Several of the Silphæ are of an entirely oval

outline: of this kind is the *S. thoracica*, which is easily distinguishable by its red thorax, every other part of the animal being coal-black; it is about half an inch in length.

Silpha atrata is of similar size, but totally black, and has the wing-sheaths marked by three rising lines: its larva, which may be found in gardens, is of a lengthened shape and of a black colour.

The genus Silpha may be considered as a numerous one, but few of the species are of any great beauty, and many are of very small size.

CASSIDA.



M. Griffiths sculp.

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CASSIDA. CASSIDA.

Generic Character.

Antennæ moniliformes, extrorsum crassiores.
Caput sub thoracis clypeo plano reconditum.
Thorax et *Elytra* dilatato-marginata.
Corpus ovale, convexum, subtus planum.

Antennæ moniliform, thickening towards the tip.
Head concealed beneath the shield of the thorax.
Thorax and *Wing-Sheaths* dilated and margined.
Body oval, convex, flat beneath.

THIS genus is readily distinguished by the singular manner in which the thorax and wing-sheaths cover the head and body, which, when the insect is laid on its back, appears somewhat like a tortoise in miniature. The genus is numerous, and among the exotic species are several of great beauty. Some of the European species are also of an elegant aspect, as the common green Cassida, or Cassida viridis of Linnæus, which is often seen during the summer months in gardens, &c. especially on mint and other verticillate plants. Its length is nearly a quarter of an inch; its shape oval, and its colour bright green above, the body or under part being coal-black. The larva, which is of a highly singular appearance, is oval, of a yellowish brown colour, and has the body edged

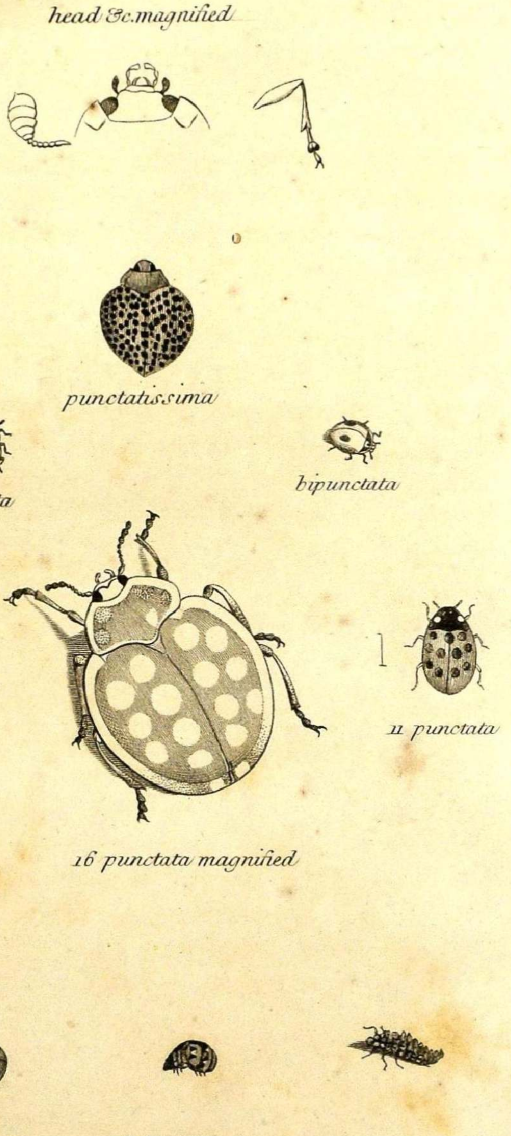
with a row or fringe of projecting fibres, the two terminal ones being much longer than the rest, and generally carried in an upright position while the animal is in motion. When ready for its change, it fastens itself to a leaf, and casting its skin, commences chrysalis, which is also of a very unusual shape, and is remarkable for the breadth or dilatation of the fore-part. From the chrysalis, in the space of three weeks, proceeds the insect in its complete state.

Cassida marginata is more than double the size of the preceding, and is of a yellowish brown colour, with blue-green thorax. It is a native of India.

Cassida lateralis is still larger, and brown with a brassy or metallic lustre, and has a large oval yellow spot on the middle of each wing-shell. It is a native of South-America.

Cassida grossa is of a still superior size, being, perhaps, the largest of the genus, and is of a bright red colour, with the wing-shells thickly marked by small black spots on the middle part, and by strong, ramified, transverse black streaks on each side. It is a native of South-America.

COCCINELLA.



M. Griffiths sculp

1805. Oct.r 1 London. Published by G. Kearsley, Fleet Street.

COCCINELLA. COCCINELLA.

Generic Character.

Antennæ subclavatæ, truncatæ.	*Antennæ* subclavated and truncated.
Palpi clava semicordata.	*Feelers* with semi-cordated tip.
Corpus hemisphæricum, abdomine subtus plano.	*Body* hemispheric, with the abdomen flat beneath.

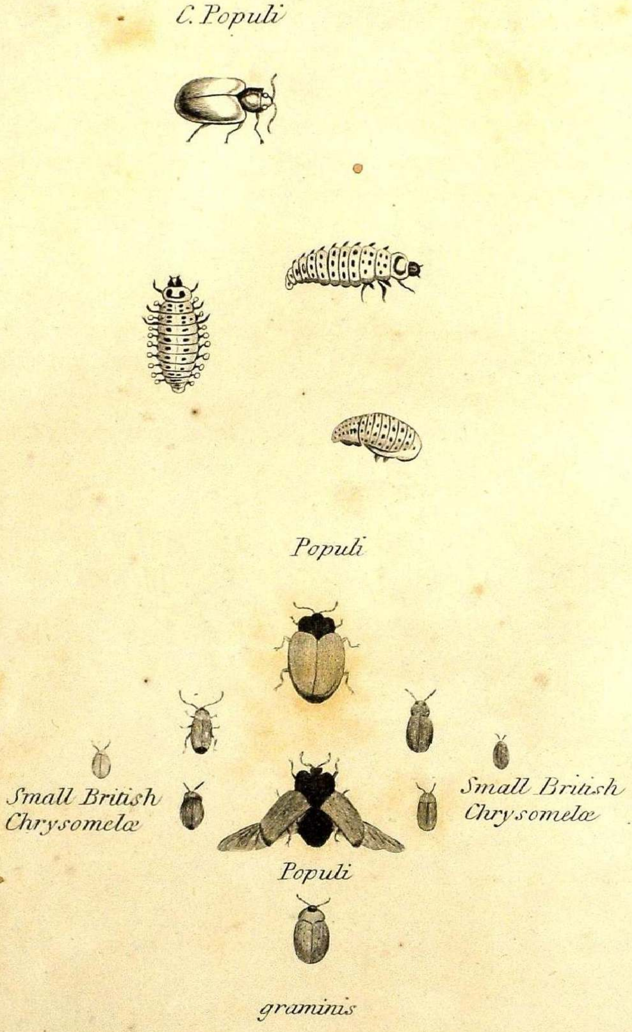
THE beautiful genus Coccinella succeeds to that of Cassida, and is easily distinguished by its hemispheric form, having the upper parts convex, and the lower flat. The insects of this genus are known by the popular name of Lady-Birds, and one species in particular is endeared to every one's recollection by irresistibly recalling the ideas of the playful amusements of infancy: this is the common or seven-spotted Lady-Bird, *Coccinella septempunctata* of Linnæus, which, in the advanced state of spring, and the middle of summer, makes its appearance in every field and garden. It proceeds from a larva of a rather disagreeable appearance, of a lengthened oval shape, with a sharpened tail, of a black colour, varied with red and white specks, and of a rough surface: it resides on various plants, and changes to a short, blackish, oval chrysalis spotted with red, and which gives birth

to its beautiful inmate in the months of May and June.

The Coccinellæ are very numerous, and some kinds are known to intermix occasionally; thus causing a considerable difficulty in determining the real distinction of the species. They are generally divided according to the ground-colour of the wing-sheaths, which are either red with black, yellow with black, black with red, or yellow with white spots. One of the most beautiful of the English species is the *Coccinella octodecim-punctata* of Linnæus, or the eighteen-spotted Lady-Bird, which is little more than half the size of the common red kind, and is of a bright yellow colour, with numerous black specks, generally eighteen in number.

The Coccinellæ, both in their larva and complete state, feed chiefly on the small insects called *Aphides*.

CHRYSOMELA



M. Griffiths sculp.

1805, Octr. 1 London, Published by G. Kearsley, Fleet Street.

CHRYSOMELA. CHRYSOMELA.

Generic Character.

Antennæ moniliformes extrorsum crassiores.	*Antennæ* moniliform, thickening towards the tip.
Thorax marginatus.	*Thorax* margined.
Corpus ovatum vel oblongum, convexum.	*Body* ovate or oblong, convex.

THE genus Chrysomela is extremely extensive, and some modern entomologists have subdivided it into several others.

Many of the Chrysomelæ are very nearly allied in point of habit or general appearance to the Coccinellæ, and have accordingly by different authors been arranged in either genus. Of this kind is the beautiful insect called *Chrysomela Populi* or the Poplar Chrysomela: it is about twice the size of the common or seven-spotted Coccinella, and is of a bright red colour, with the tips of the wing-shells black, and the thorax of a greenish or blueish black. It is found on the black and white poplars, willows, &c. and proceeds from a larva of nearly similar appearance to those of the genus Coccinella: it is of a pale yellowish green colour speckled with black, and edged with rows of small tubercles, those on the sides projecting in such a manner as to represent so many conical papillæ.

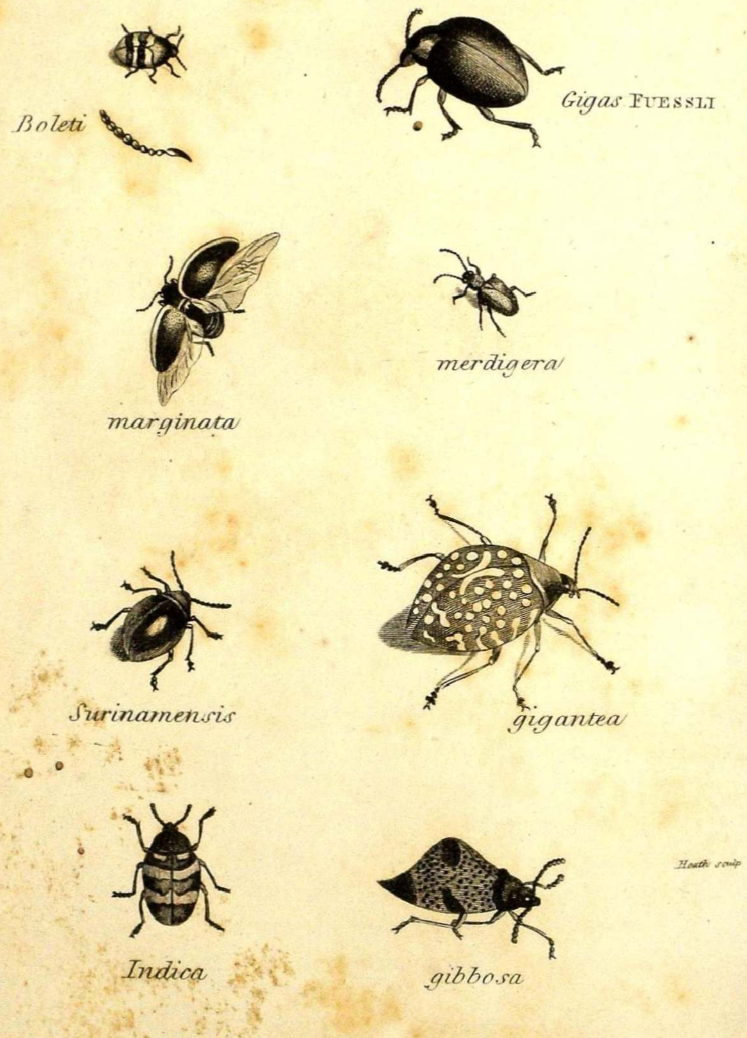
Linnæus observes that this larva diffuses, on handling, a highly fetid, and even insupportable smell. In general, on touching the larva, a small drop of white fluid instantly appears from a pore on the tip of each of the lateral tubercles, and after some time, again disappears. It is this white fluid which diffuses the odour above-mentioned, and which is of so penetrating a nature, that on handling the animal, the smell will often remain on the fingers throughout the whole day. Even when recently hatched these larvæ possess the power of discharging the fetid fluid. In the month of June the larva changes to a short brown chrysalis, so fastened as to hang by its extremity from the footstalk of a leaf or twig; and from this, in the space of a fortnight or less proceeds the complete Chrysomela.

Chrysomela Asparagi is an insect of peculiar beauty: it is often seen feeding on the Asparagus, and is of an oblong or subcylindric shape, with red thorax, and yellow wing-shells marked by blackish-blue bands.

Chrysomela Graminis is a common, but highly elegant insect, measuring about the fifth of an inch in length, and being of a most vivid but deep golden-green colour: the male, which is somewhat smaller, is often tinged with copper-colour: this species is of an extremely convex shape.

Chrysomela Betulæ is one of the richest of the genus, being entirely of the most brilliant and beautiful grass-green: it is found on Birch-trees.

Chrysomela merdigera is of an oblong form, and



1805, Oct. 1 London, Published by G. Kearsley, Fleet Street.

of a red colour, with a somewhat cylindric thorax. It is a native of our own Island, and measures about a third of an inch in length.

Chrysomela Boleti is a middle-sized species of a black colour, with three waved yellow bands across the wing-sheaths. It is an English insect, and is chiefly found on Boleti and other Fungi.

Chrysomela Indica greatly resembles the former, but is of larger size, and is brown with two waved yellow bands across the wing-sheaths. It is found in India.

Chrysomela Surinamensis is one of the larger insects of the genus, is of a deep blue colour, and of a smooth surface, with the antennæ and feet brown. It is found in Surinam, and sometimes varies into copper-colour.

Chrysomela Gigas (Fuessli Arch.) is a large species entirely of a fine blue colour. It is said to be a native of Surinam, and in point of habit or general appearance makes a near approach to a species of Tenebrio not uncommon in our own Island.

Chrysomela gibbosa is a large species, of a pale orange-colour with numerous, small black spots, and a transverse band across the middle and tips of the wing-sheaths, which rise up into an almost conical convexity in the middle: the thorax is black. It is a native of South-America.

Chrysomela gigantea, the largest of the genus, is black, with the wing-shells marked by very numerous orange-coloured spots, and is a native of India.

HISPA. HISPA.

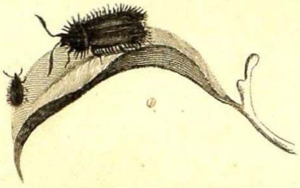
Generic Character.

Antennæ fusiformes, basi approximatæ, inter oculos sitæ.
Thorax elytraque sæpius aculeata.

Antennæ spindle-shaped, approximated at the base, situated between the eyes.
Thorax and wing-shells generally aculeated.

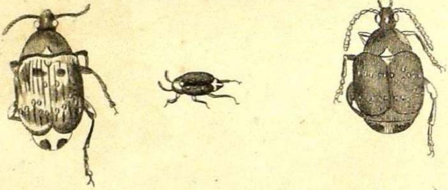
THE principal British species of this genus is a rather small insect, sometimes found near the roots of grasses: it is totally black; and has the wing-shells beset with six rows of spines, and the thorax with a few distant ones. It is considered as a rare insect, and its larva is unknown.

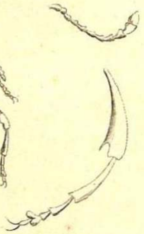
HISPA



H. atra nat. size & slightly magnified

BRUCHUS.





B. Pisi & slightly magnified

B. Bactris

B. bipunctatus & magnified

Heath sculp.

1805 Oct.1 London Published by G.Kearsley Fleet Street.

BRUCHUS. BRUCHUS.

Generic Character.

Antennæ filiformes, sensim crassiores.	*Antennæ* filiform, gradually thickening.
Caput retracto-inflexum.	*Head* retracted and inflected.
Thorax antice attenuatus.	*Thorax* attenuated in front.
Elytra truncata, abdomine breviora.	*Wing-Shells* truncated, shorter than the abdomen.

THE genus Bruchus consists, in general, of small insects. The *Bruchus granarius* is found among beans, vetches, and other seeds, the lobes of which it devours. It is scarcely two lines in length, and is black, with the wing-shells freckled by white specks: the two fore-legs are reddish, and the antennæ of similar colour at the base: the thighs of the hind-legs are armed with a tooth or process.

The *Bruchus seminarius* is a rather smaller than the preceding species, which it considerably resembles, but has the hinder thighs plain, or without the denticle. The larvæ of these species seem to have been not yet observed.

The exotic species are chiefly natives of America. Among these the *Bruchus Bactris* is one of the most remarkable, and is found in the nuts of the Palm of that name: it is of a grey colour, with the thighs of the hind-legs ovate.

CURCULIO. WEEVIL.

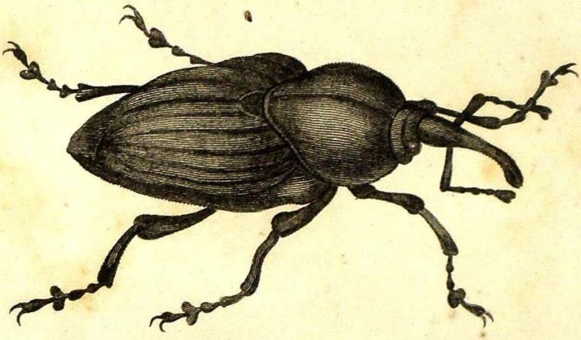
Generic Character.

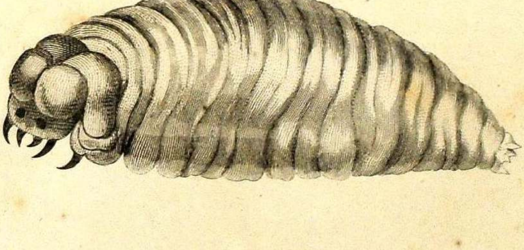
Antennæ subclavatæ, rostro insidentes.	*Antennæ* subclavated, situated on the snout.
Rostrum corneum, prominens.	*Snout* horny, prominent.

THIS genus is extremely extensive. Among the largest of the exotic species may be numbered the *Curculio Palmarum* or Palm Weevil, which is entirely of a black colour, and measures more than two inches in length from the tip of the snout to the end of the body. Its larva, which is very large, white, and of an oval shape, resides in the tenderest part of the smaller palm-trees, and is considered, when properly fried or broiled, as one of the greatest dainties in the West Indies. "The tree," says Madam Merian, "grows to the height of a man, and is cut off where it begins to be tender, is cooked like cauliflower, and tastes better than an artichoke. In the middle of these trees live innumerable quantities of worms, which, at first, are as small as a maggot in a nut, but afterwards grow to a very large size, and feed on the marrow of the tree. These worms are laid on the coals to roast, and are considered as a highly agreeable food."

CURCULIO.

C. Palmarum





larva

Heath sculp.

1805, Oct. 1 London, Published by G Kearsley, Fleet Street

CURCULIO.

21

C. nucum.

Heath sculp.

1805, Oct. 1 London Published by G. Kearsley Fleet Street.

The *Curculio nucum* or Nut Weevil is well deserving of attention, and is the insect produced by the maggot residing in the hazel nut. Though every one is well acquainted with the maggot in the nut, yet the various changes through which it passes, the mode of its introduction into the nut, and its appearance in its complete or perfect state are what few that are not conversant in the history of insects have the least knowledge of. The insect makes its appearance early in the month of August, and may then be found creeping about hazel trees. The female insect, when ready to deposit her eggs, singles out a nut, which she pierces with her proboscis, and then, turning round, deposits an egg in the cavity. She then passes on, and singles out another nut, which she pierces in the same manner, placing an egg in it, and thus proceeds till she has deposited in different nuts her whole stock. The nut, not apparently injured by this slight perforation, continues to grow, and gradually ripens its kernel. When the egg is hatched, the young larva or maggot, finding its food ready prepared, begins to feast on the kernel. By the time that it has arrived at its full growth, and has nearly consumed the whole of the kernel, the natural fall of the nut takes place: the inclosed larva, not in the least injured by the fall, continues in the nut some time longer, and then creeps out at the hole in the side, which it has previously made, by gnawing in a circular direction, and immediately begins to burrow or creep under the surface of the ground, till, having at-

tained the depth sufficient for its convenient residence during the long period of its winter concealment, it lies dormant for eight months, and then, casting its skin, commences a chrysalis, of the same general shape and appearance with the rest of the beetle tribe; and it is not till the beginning of August that it arrives at its complete or ultimate form, at which period it casts off the skin of the chrysalis, creeps to the surface, and commences an inhabitant of the upper world. During this state it breeds, and, like the major part of the insect race, enjoys, for a short time, the pleasures of a more enlarged existence. As a species it is distinguished by its brown colour, and the great length and slenderness of its curved snout: it measures nearly half an inch in length from the tip of the snout to that of the body.

Dr. Darwin, in his elegant poem The Botanic Garden, thus beautifully expresses the egress of this insect from the cavity of the nut.

> "So sleeps in silence the Curculio, shut
> In the dark chambers of the cavern'd nut,
> Erodes with ivory beak the vaulted shell
> And quits on filmy wings it narrow cell."

To this genus belongs the destructive insect peculiarly called the *Weevil*, which is the *Curculio granarius* of Linnæus: its colour is an uniform dull chesnut or reddish brown, and its length scarcely two lines: the female insect perforates a grain of wheat, and in it deposits an egg, or two at most, (a grain of wheat being incapable of

nourishing more than two of the young brood when hatched,) and this she does to five or six grains every day, for several days together: these eggs, not above the size of a grain of sand, in about seven days, produce a small white maggot or larva, which devours the substance of the grain in which it is lodged, and then changes into a chrysalis, from which, in about fourteen days, proceeds the complete insect. This is, perhaps, the insect mentioned by Virgil, among the animals injurious to corn.

> " ———*populatque ingentem farris acervum*
> *Curculio.*"

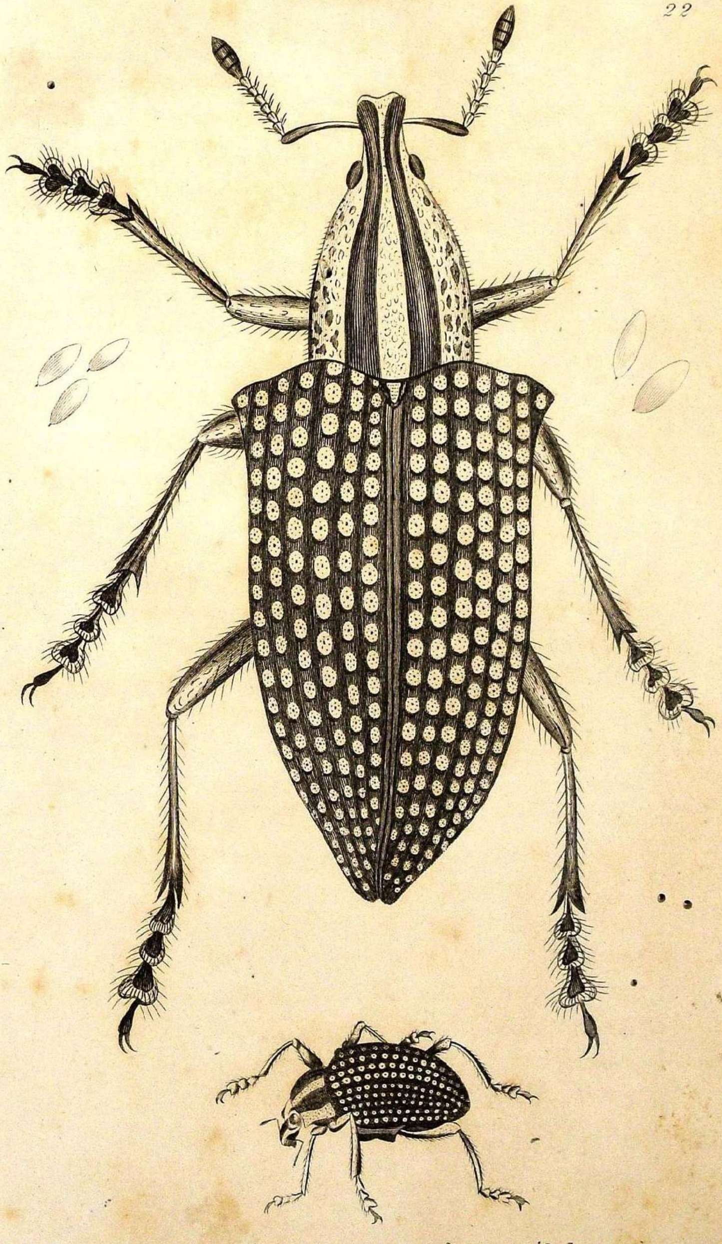
Another species, which also makes its unwelcome appearance among corn, is the *Curculio frumentarius*. Its size is that of the *granarius* or *Weevil*, and its colour a bright red: it is an insect of great beauty, and is frequently seen during the autumnal season creeping about sunny walls, &c.

Many of the exotic species are of very considerable size and possessed of great beauty of colour; but of all the insects of the genus Curculio, and even (in the opinion of some entomologists), of all known insects, the most brilliant and beautiful is the *Curculio imperialis* or Imperial Curculio, commonly known by the name of the Diamond Beetle. It is a native of Brasil, and usually measures about an inch in length: the ground-colour of the wing-sheaths is coal-black, but along each are distributed numerous parallel rows of sparkling concavities, of a round shape, and of a gold-green

colour; but which, when properly magnified, exhibit the varying lustre of the most brilliant gems: this appearance is owing to innumerable minute scales, analogous to those on the wings of butterflies, and which, by their polished surface and different juxtaposition, produce the admired effect just mentioned: they are of an oblong-oval shape, alike at both ends, and not dilated and notched at the tips as in the butterfly tribe. Every other part of the insect is also decorated with similar scales, but not in the form of spots; and along the thorax they are disposed into parallel, broad, longitudinal bands. This species has been faithfully figured in the works of Drury, Olivier, &c. but it is utterly impossible for any figure of the natural size to convey any idea of more than the general appearance of the animal. The engraving annexed to the present description exhibits a magnified view of the insect, accompanied by one of the natural size, as well as by several of the shining scales, very highly magnified, in order to shew their particular shape.

Another species, not greatly inferior in beauty to the former, is the *Curculio regalis*, a native of New Holland, and which in its general shape and ground-colour, bears a near resemblance to the preceding, but is decorated with large, brilliant, gold-coloured patches, dispersed over the wing-shells, and which also owe their brilliancy to innumerable golden scales, as in the C. imperialis.

Nor is our own country destitute of a species of almost equal elegance, though far inferior in size;



C. imperialis nat. size & magnified.

M. Griffiths sculp.

1805, Oct. 1 London, Published by G. Kearsley, Fleet Street.

since the *Curculio argentatus*, a small insect of about a quarter of an inch in length, and of the most beautiful gold or silver-green colour, exhibits, when viewed with a microscope, a splendor of a similar nature, and produced by a covering of similar scales, shining with a metallic lustre. It is frequently seen during the summer months in fields and gardens.

So very extensive is the genus Curculio, that Mr. Marsham, in his *Entomologia Britannica*, enumerates no fewer than 234 British species.

ATTELABUS. ATTELABUS.

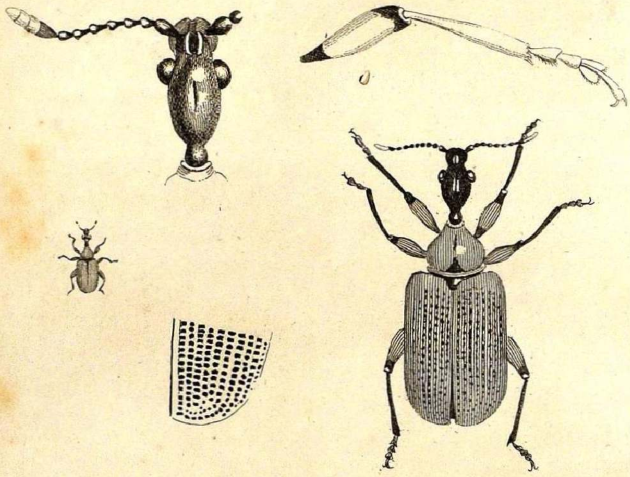
Generic Character.

Caput postice attenuatum.	*Head* attenuated behind.
Antennæ apicem versus crassiores.	*Antennæ* thickening towards the tip.

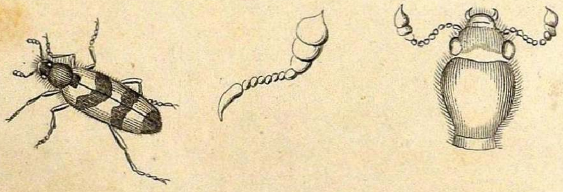
Of the genus Attelabus one of the principal species is the *Attelabus Coryli* of Linnæus, which is a smallish insect, found chiefly on hazel trees, and is black, with red wing-sheaths; and a variety sometimes occurs in which the thorax is red also: it usually measures about a quarter of an inch in length.

A much smaller species is the *Attelabus Betulæ*, which is found on the Birch: it is entirely of a black colour, and is remarkable for gnawing the leaves of that tree, during the early part of spring, in such a manner that they appear notched on the edges. The thighs of the hind-legs in this insect are of a remarkably thickened form. The larvæ of the Attelabi do not seem to have been distinctly described, but they probably bear a resemblance to those of the genus Curculio. Linnæus refers to the genus Attelabus some insects which by later entomologists have been otherwise arranged: among these is the elegant species called *Attelabus apiarius*, so named from the mischief which its

ATTELABUS.



Att Coryli & d°. magnified



Att apiarius

Heath sculp

1805 Octr 1st London Published by G Kearsley Fleet Street

larva occasionally commits among bee-hives, destroying the young of those insects. It is about three quarters of an inch in length, and of a beautiful violet-black, with red wing-shells, marked by three black transverse bands. The whole insect is also covered with fine short black hair. It is common in some parts of France, Germany, &c. Its larva above-mentioned is of a bright red colour.

CERAMBYX. CERAMBYX.

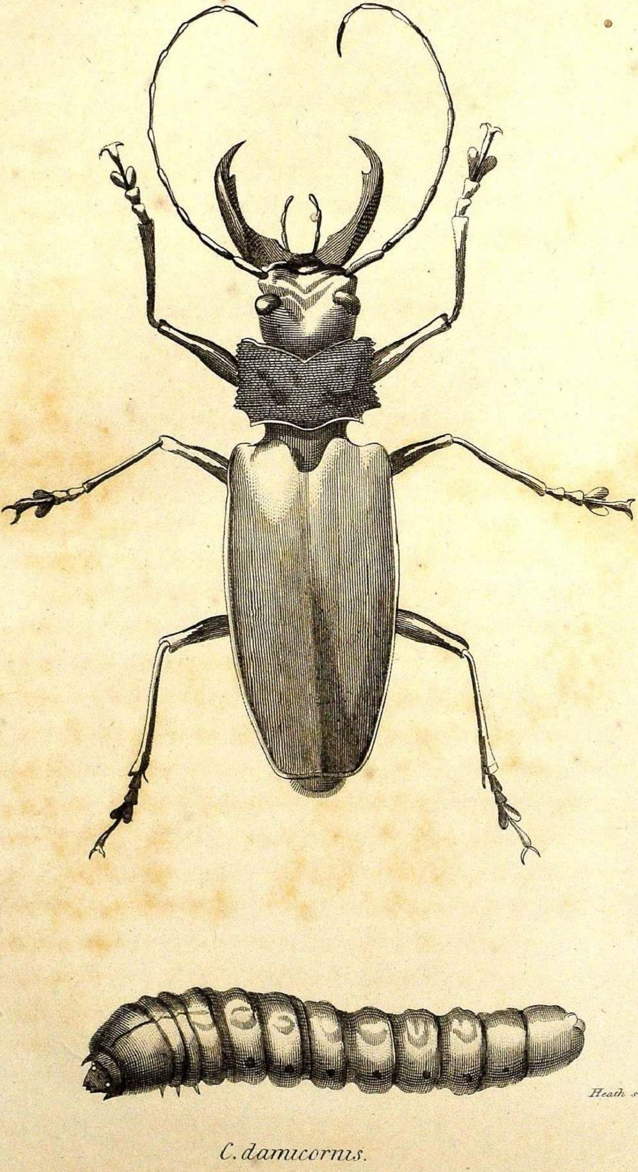
Generic Character.

Antennæ attenuatæ.	*Antennæ* slender and gradually attenuated.
Thorax spinosus aut gibbus.	*Thorax* either spiny or bulging.
Elytra sublinearia.	*Wing-Sheaths* sublinear.
Corpus oblongum.	*Body* oblong.

THE genus Cerambyx is of vast extent, comprehending many insects of the most extraordinary appearance, and of a size superior to any in the order Coleoptera except those of the genus Scarabæus. Their larvæ are chiefly found in decayed trees, and resemble those of the Beetle, but are of a more lengthened form.

Among the most singular species may be numbered the *Cerambyx longimanus* or long-limbed Cerambyx, measuring about three inches in length from head to tail: the wing-sheaths are beset with a very fine down, and are most elegantly varied with red, black, and yellow, in the form of stripes, disposed in various directions: the fore-legs are of excessive length, very strong, and of a black colour, with broad red bars: the antennæ are long and black. This species is elegantly figured by

CERAMBYX.



Heath sculp

C. damicornis.

1805, Oct.r 1 London. Published by G Kearsley Fleet Street

Madam Merian in her celebrated work on the Insects of Surinam.

The *Cerambyx Gigas* is a species which seems to have been first described in the work of Mr. Drury on exotic insects: it is, perhaps, the most gigantic of the whole genus, measuring between six and seven inches in length: the wing-shells are of a dark brown colour, and every other part of the insect black.

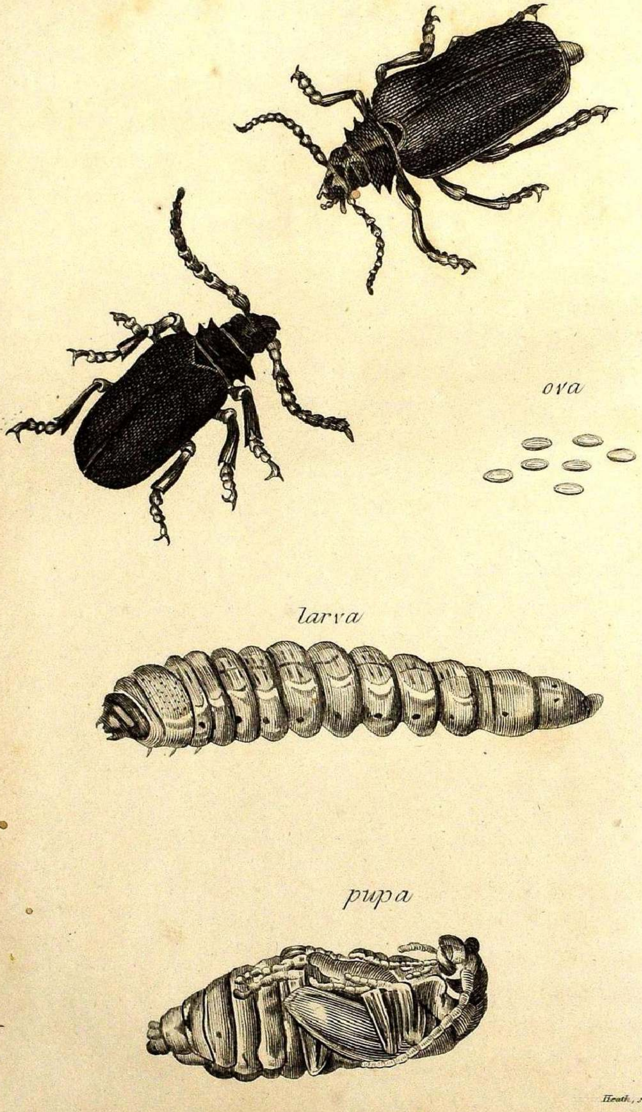
The *Cerambyx damicornis* is one of the larger species, though very considerably inferior to the two preceding: it is of a dark chesnut-colour, with very long, curved jaws, spined or serrated on the inner side, as in those of the Stag-Beetle or Lucanus Cervus, to which this insect bears a considerable general resemblance. It is a native of many parts of America and the West-Indian islands, where its larva, like that of the Palm Curculio, is in great request as an article of food, being considered by the transatlantic epicures as one of the greatest delicacies in the Western World. We are informed by authors of the highest respectability, that some people of fortune in the West-Indies keep Negroes for the sole purpose of going into the woods in quest of these admired larvæ, and scooping them out of the trees in which they reside. Their general length is about three inches and a half, and their thickness that of the little finger. Dr. Browne, in his History of Jamaica, informs us that they are chiefly found in the Plumb and Silk-Cotton-Trees. They are commonly called by the name of Ma-

caccos, or Macokkos. The mode of dressing them is first to open and wash them, and then carefully broil them over a charcoal fire.

Cerambyx cinnamomeus is a somewhat smaller species, and is entirely of a pale ferruginous brown colour: the thorax is marked on each side by two spines, and the wing-shells are each tipped by a very small projecting point. It is a native of South-America.

Among the European species of this very extensive genus none are more remarkable than the *Cerambyx moschatus,* commonly called the musk goatchaffer, so named from its powerful scent, which however is far more agreeable than that of the substance from which it takes its name, resembling rather the combined scent of roses, musk, and ambergris. So diffusive is this agreeable odour, that, whenever the insect makes its appearance, which is commonly in the hottest part of July, it may be smelt to a considerable distance, and if taken and rolled up for some minutes in a handkerchief, will perfume it for the whole day. This insect, which is not very uncommon in many parts of our own country, measures about an inch and quarter in length, from the head to the end of the body: its colour is a fine dark green, with a slight gilded tinge on the upper parts, and sometimes it varies in having a strong cast of blue or purple: the antennæ are rather shorter than the body. It is chiefly found on willows and poplars, in the decayed wood of which its larva resides. It has been found that the

CERAMBYX.



Heath, sculp.

C. coriarius

1805, Oct. 1 London. Published by G. Kearsley, Fleet Street.

Cerambyx moschatus, when dried and reduced to powder, and made use of as a vesicatory, in the manner of the officinal Cantharides, produces a similar effect, and in as short a space of time *.

Cerambyx coriarius of Linnæus is also one of the larger European species, measuring near an inch and half in length, and is of a broadish shape, with thick, serrated antennæ of moderate length: the thorax is armed on each side with three sharp spines or denticulations, and the whole insect is of a deep brown colour. It proceeds from a large yellowish white larva, with a chesnut-coloured head, which resides in the hollows of decayed trees, and changes into a chrysalis of similar colour.

Cerambyx ædilis is one of the smaller or middle-sized species. It is a native of many parts of Europe, and is found in our own country, though not a very common insect. It is of a grey colour, with two or three obscure transverse brown bands, and the thorax is marked by four yellow spots: it is remarkable for the excessive length of its antennæ, which, in the male especially, are five or six times that of the body. It is found in old decayed timber, and in the trunks of trees.

* Drur. ins. 1. pref. p. ix.

LEPTURA. LEPTURA.

Generic Character.

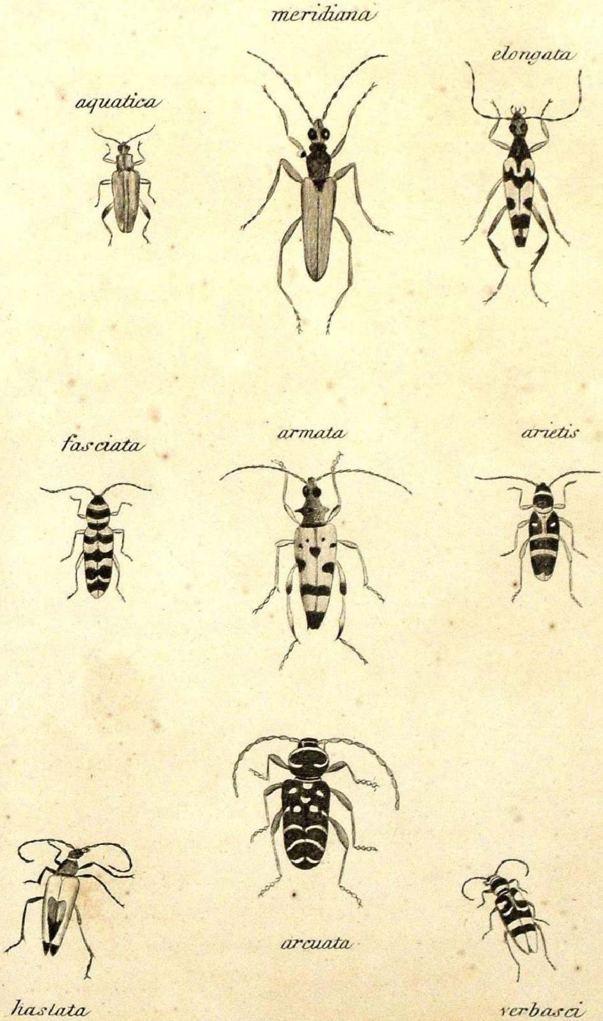
Antennæ setaceous.	*Antennæ* setaceous.
Elytra apicem versus attenuata.	*Wing-Sheaths* attenuated towards the tip.
Thorax teretiusculus.	*Thorax* subcylindric.

THE genus Leptura, greatly allied to that of Cerambyx, contains several species of considerable beauty, among which may be reckoned the *Leptura arcuata*, of a black colour, with the wing-sheaths marked by transverse, yellow, lunated bands pointing backwards: it is found in woods during the summer months, and generally measures about three quarters of an inch in length.

Leptura arietis is of nearly similar appearance, but the second band of the wing-sheaths is directed forwards: both the above insects are by some referred to the genus Cerambyx.

Leptura aquatica is so named from its being particularly found in the neighbourhood of waters, frequenting the plants which grow near the water's edge. It is about half an inch in length, and of a golden green colour, sometimes varying into copper-colour, purple, or blue, and is distinguished by having a tooth or process on the thighs of the hind-legs.

LEPTURA.



M. Griffiths sculp.

1805 Octr. 1st London Published by G. Kearsley Fleet Street.

Leptura meridiana is one of the larger European species, often measuring an inch in length, and is a very common insect during the decline of summer in fields and woods, generally appearing in the hottest part of the day. It is of a dull brown colour above, sometimes yellowish-chesnut, and beneath is of a brilliant tawny yellow, shining with the lustre of satin. It has very much the general appearance of a Cerambyx, and might perhaps with equal propriety be referred to either genus. The larvæ of the Lepturæ in general are probably allied to those of the Cerambyces, but they are at present very little known.

NECYDALIS. NECYDALIS.

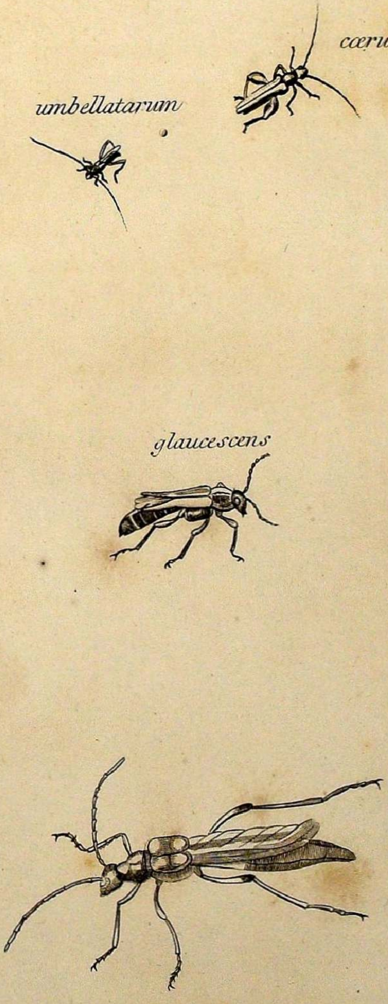
Generic Character.

Antennæ setaceæ.	*Antennæ* setaceous.
Elytra alis minora, breviora, seu angustiora.	*Wing-Sheaths* smaller, shorter, or narrower than the wings.
Cauda simplex.	*Tail* simple.

IN this genus the thorax is narrow and rounded, the body of a lengthened shape, and the wing-shells generally smaller than the wings. One of the most common species is the *Necydalis minor*, an insect seen in fields and about hedges in the summer months, and which has somewhat of the habit of a small Cerambyx, but the wing-sheaths are but half the length of the body, and are grey-brown, each marked at the tip with a linear white spot, the rest of the insect being black. Its length is rather more than a quarter of an inch.

Necydalis cærulea is a beautiful species. It is about half an inch in length, and entirely of a bright blue colour, sometimes greenish blue: the wing-shells are of the length of the body, but narrow, so as not to cover the sides of the wings; and the hind-thighs are very thick. It is found in woods during the summer months.

NECYDALIS.

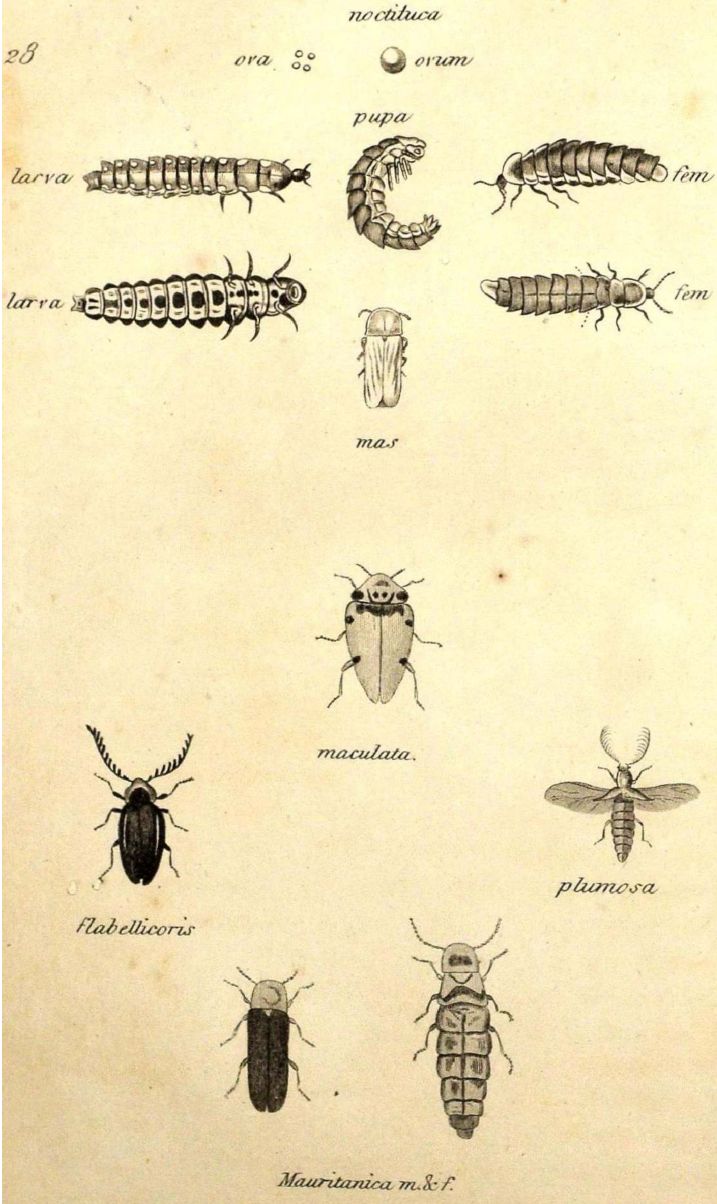


Heath sculp.

1805, Oct.1 London, Published by G. Kearsley, Fleet Street.

28

LAMPYRIS.



M. Griffiths sculp.

1803, Octr 1 London Published by G. Kearsley, Fleet Street.

LAMPYRIS. GLOW-WORM.

Generic Character.

Antennæ filiformes.	*Antennæ* filiform.
Elytra flexilia.	*Wing-Sheaths* flexile.
Thorax planus, semiorbicularis, caput subtus occultans cingensque.	*Thorax* flat, semiorbicular, concealing and surrounding the head.
Abdominis latera plicato-papillosa.	*Abdomen* with the sides pleated into papillæ.
Femina aptera plerisque.	*Female* (in most species) wingless.

THE body in this genus is oblong, with the sides formed into a kind of soft papillæ lapping over each other.

The *Lampyris noctiluca* or common Glow-Worm is a highly curious and interesting animal. It is seen during the summer months, as late as the close of August, if the season be mild, on dry banks, about woods, pastures, and hedgeways, exhibiting, as soon as the dusk of the evening commences, the most vivid and beautiful phosphoric splendor, in form of a round spot of considerable size. The animal itself, which is the female insect, measures about three quarters of an inch in length, and is of a dull earthy brown colour on the upper parts, and beneath more or less tinged with rose-

colour, with the two or three last joints of the body of a pale or whitish sulphur-colour. It is from these parts that the phosphoric light above-mentioned proceeds, which is of a yellow colour, with a very slight cast of green: the body, exclusive of the thorax, consists of ten joints or divisions. The larva, pupa, and complete female insect scarcely differ perceptibly from each other in general appearance, but the phosphoric light is strongest in the complete animal. The Glow-Worm is a slow-moving insect, and in its manner of walking frequently seems to drag itself on by starts or slight efforts as it were. The male is smaller than the female, and is provided both with wings and wing-sheaths: it is but rarely seen, and it seems, even at present, not very clearly determined whether it be luminous or not. The general idea among naturalists has been that it is not, and that the splendor exhibited by the female in this species is ordained for the purpose of attracting the male. This circumstance is elegantly expressed in some beautiful lines of Mr. Gilbert White, in his History of Selburne.

> "The chilling night-dews fall; away, retire;
> For see, the glow-worm lights her am'rous fire!
> Thus, ere night's veil had half obscur'd the sky,
> Th' impatient damsel hung her lamp on high:
> True to the signal, by love's meteor led,
> Leander hasten'd to his Hero's bed."

Dr. Darwin also, in his admired poem the Botanic Garden, commemorates the splendor of the Glow-Worm among other phenomena supposed to be

produced under the superintendance of the Nymphs of Fire.

> "You with light gas the lamps nocturnal feed
> That dance and glimmer o'er the marshy mead;
> Shine round Calendula at twilight hours,
> And tip with silver all her saffron flowers;
> Warm on her mossy couch the radiant worm,
> Guard from cold dews her love-illumin'd form,
> From leaf to leaf conduct the virgin light,
> Star of the earth, and diamond of the night!"

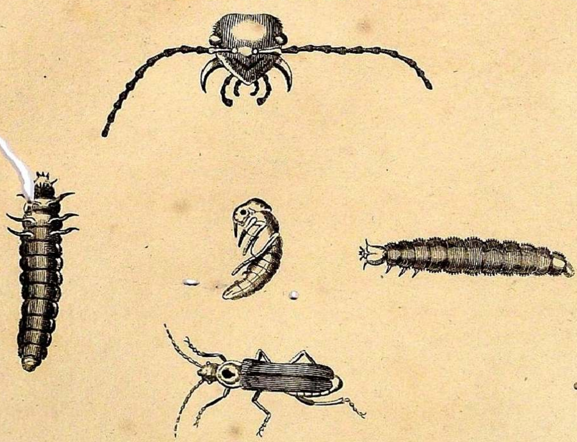
It is certain that in some species of this genus the male as well as the female is luminous, as in the *Lampyris Italica*, which seems to be a native of our own island also, though less common here than in the warmer parts of Europe. Aldrovandus describes the winged Glow-Worm as having its wing-shells of a dusky colour, and at the end of the body two brilliant fiery spots like the flame of sulphur.

In the Philosophical Transactions for the year 1684 we find a paper by a Mr. Waller, describing the English flying glow-worm as of a dark colour, with the tail part very luminous: he maintains that both male and female of this species are winged, and that the female is larger than the male: the light of this insect was very vivid, so as to be plainly perceived even when a candle was in the room. Mr. Waller observed this species at Northaw in Hertfordshire. From the figure given by this writer it appears to be about half an inch in length, which is much smaller than the common female glow-worm.

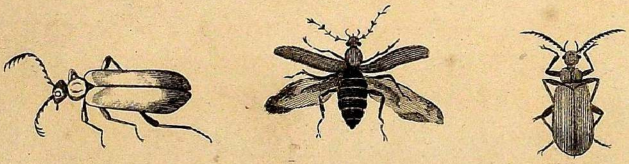
In Italy this flying glow-worm is extremely plentiful, and we are informed by Dr. Smith, and other travellers, that is a very common practice for the ladies to stick them by way of ornament in different parts of their head-dress during the evening hours.

The common or wingless Glow-Worm may be very successfully kept, if properly supplied with moist turf, grass, moss, &c. for a considerable length of time, and, as soon as the evening commences, will regularly exhibit its beautiful effulgence, illuminating every object within a small space around it, and sometimes the light is so vivid as to be perceived through the box in which it is kept. This insect deposits its eggs, which are small and yellowish, on the leaves of grass, &c.

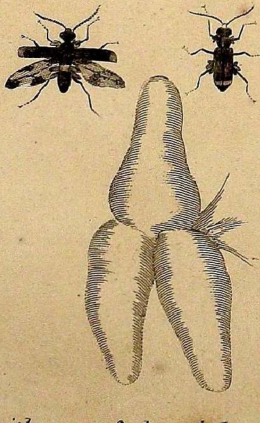
CANTHARIS.



C. fusca c̄ larv. & pup.



C. Cardinalis or scarlet Cantharis.



Heath sculp

C. bipustulata, with one of the triple vesicles magnified.

1805, Oct. 1 London, Published by G. Kearsley, Fleet Street.

CANTHARIS. CANTHARIS.

Generic Character.

Antennæ setaceæ.	*Antennæ* setaceous.
Thorax marginatus, capite brevior.	*Thorax* margined, shorter than the head.
Elytra flexilia.	*Wing-Sheaths* flexile.
Abdominis latera plicato-papillosa.	*Abdomen* pleated into papillæ on the sides.

ONE of the most elegant insects of this genus is the *Scarlet Cantharis*, (doubtful whether a Linnæan species). It is entirely of a vivid red, except the body, legs, and antennæ, which are coal-black. Its length is something more than half an inch.

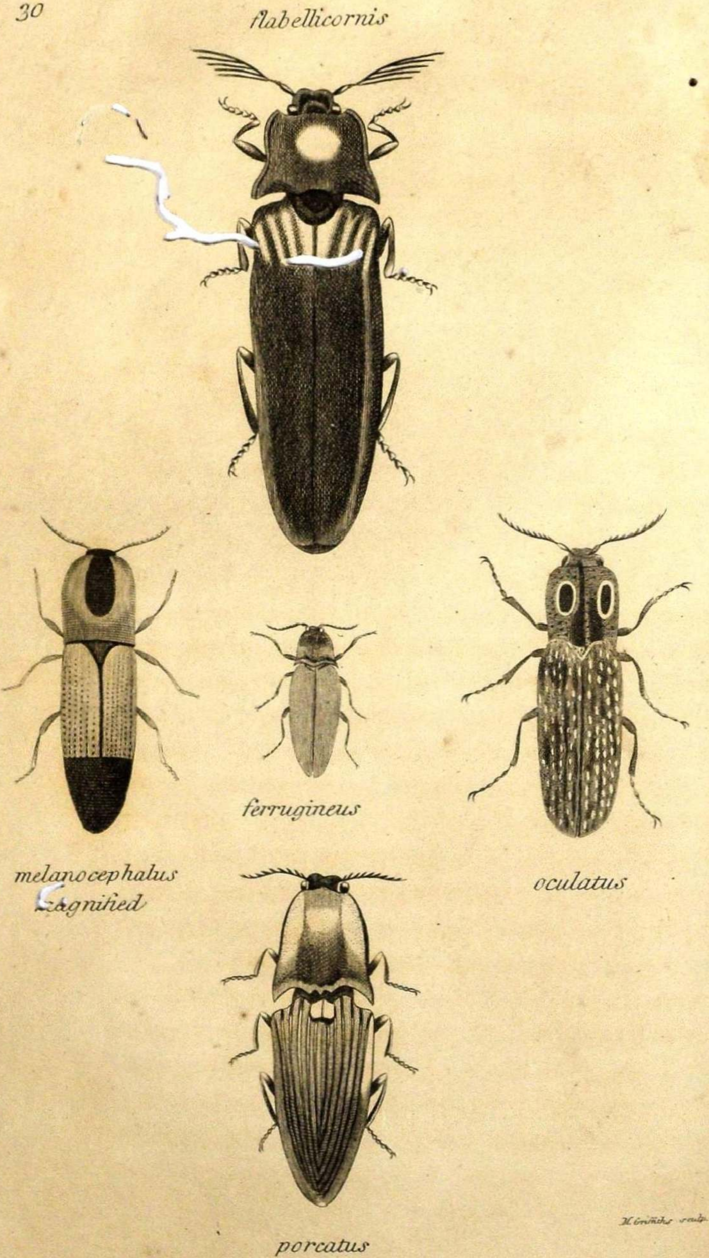
Cantharis bipustulata is a beautiful insect, considerably smaller than the preceding, and of a more slender or cylindric shape: its colour is a very dark but elegant gilded green, with the tips of the wing-shells red, and on each side the thorax, a little below the setting on of the wing-shells, is a triple vesicle, of a bright red colour, extensile or retractile at the pleasure of the insect, and which, if accurately observed by the microscope, will generally be found to exhibit an alternate inflation and contraction, resembling that of the lungs in the larger animals. This species is found dur-

ing the middle of summer on various plants, and particularly on nettles.

Cantharis fusca is of the same size with the scarlet species first described, and is of a dull brown or blackish cast, with the thorax red, having a black central spot. Another species is of exactly similar appearance in every thing but colour, being of a yellowish brown both on the thorax and wingshells: it seems to be the *Cantharis livida* of Linnæus: both these insects are of a very voracious nature, and are often observed to prey even on their own species.

30

ELATER



1805, Octr. 1 London Published by G. Kearsley, Fleet Street.

ELATER. ELATER.

Generic Character.

Antennæ setaceæ.
Corpus elongatum, dorso impositum exiliens mucrone pectoris e foramine abdominis resiliente.

Antennæ setaceous.
Body oblong, when placed on the back, springing up, by means of the pectoral spine starting from the abdominal foramen.

THE leading character in this genus is a strong spine situated beneath the thorax, and so constituted by Nature as to fit at pleasure, into a small cavity on the upper part of the abdomen; thus enabling the insect, when laid on its back, to spring up with great force, in order to regain its proper position.

This genus is pretty extensive, but few of the European species are comparable in point of size to those which are natives of the tropical regions. Among the most remarkable of these may be numbered the *Elater flabellicornis*, an insect measuring not less than two inches and a half in length, and which differs from the rest in having very strongly pectinated antennæ, the divisions of which, forming a kind of fan on the upper part of each, are nearly a quarter of an inch long: the

colour of this animal is an uniform brown, and it is a native of many parts of India and Africa.

The *Elater oculatus* is also a large species, though not equal to the preceding: it is a native of many parts both of North and South-America, and is of a dark brown or blackish colour, with the thorax marked on each side by a very large, oval, velvet-black spot, surrounded by a white margin.

A still more remarkable insect is the *Elater noctilucus*, called in South-America, where it is not uncommon, by the title of *Cocujas*. It is about an inch and half long, and of a brown colour, with the thorax marked on each side by a smooth, yellow, semitransparent spot: these spots, like those on the abdomen of the Glow-Worm, are highly luminous, diffusing, during the night, so brilliant a phosphoric splendor, that a person may with great ease read the smallest print by the insect's light, if held between the fingers and moved along the lines: but if eight or ten be put into a clear phial, they will afford a light equal to that of a common candle. It is said that the inhabitants of Hispaniola, &c. before the first arrival of the Spaniards, made use of no other light than these insects; and we are informed by Mouffet, that when Sir Thomas Cavendish and Sir Robert Dudley, son to the Earl of Leicester, first landed in the West-Indies, and saw, the same evening, an infinite number of moving lights in the woods, they supposed that the Spaniards were advanced upon them unawares, and immediately betook themselves to their ships.

Many species of Elater are natives of our own country; but they are rarely distinguished by any brilliancy of colour, and are far inferior in size to any of the exotic ones above-mentioned. One of the largest is the *Elater ferrugineus*, measuring about three quarters of an inch, and as its name imports, of a ferruginous or reddish-brown colour; but the hind part of the thorax is bordered with black: it is found in fields, among grass, in the month of June.

The *Elater sanguineus* is considerably smaller, and is distinguished by its bright-red wing-sheaths, the body and thorax being black: it is found in similar situations with the preceding.

Elater tesselatus is of the size of ferrugineus, and is brown, with a slight coppery tinge, and scattered over with fine ash-coloured pile, in such a manner as to appear tesselated or marked into minute squarish divisions: it is not uncommon in fields during the middle of summer. The larvæ of these insects are of a slender form, and devour the roots of the grasses, &c. That destructive insect known by the name of the wire-worm is said to be the larva of the *Elater obscurus*.

CICINDELA. CICINDELA.

Generic Character.

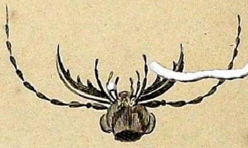
Antennæ setaceæ.	*Antennæ* setaceous.
Maxillæ prominentes, denticulatæ.	*Jaws* prominent, denticulated.
Oculi prominuli.	*Eyes* protuberant.
Thorax rotundato-marginatus.	*Thorax* roundish and margined.

THE insects of the genus Cicindela, (a name by the ancient writers applied to the Glow-Worm) are rather small than large, and are remarkable for the celerity and vigour of their flight: they are generally seen on the wing in the hottest part of the day, chiefly frequenting dry meadows, sandy banks, &c.

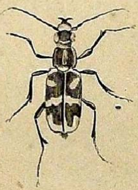
The *Cicindela campestris*, one of the most common European species, is a highly beautiful insect, being of a bright grass-green, with the wing-shells each marked by five small, round, white spots: the head, thorax, and limbs are of a rich gilded cast, and the eyes black and prominent, the legs are long and slender: it is common in fields: its general length is about six lines.

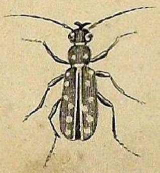
A species of similar size, and not much inferior elegance is the *Cicindela sylvatica*, of a dark or

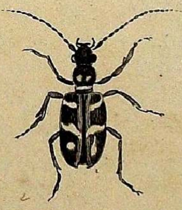
Head magnified

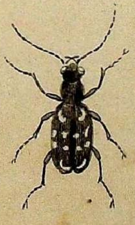


hybrida *campestris*









sylvatica *memoralis*

Heath sculp

1805, Octr 1 London. Published by G Kearsley, Fleet Street

blackish purple colour, with the wing-sheaths each marked by an undulated whitish band and three white spots: it frequents woods and is far less common than the former.

The larvæ of the Cicindelæ are of a lengthened shape, somewhat like those of the smaller Cerambyces, and are furnished with strong, curved jaws: they inhabit tubular hollows, which they form near the surface of the ground, and prey on the smaller insects.

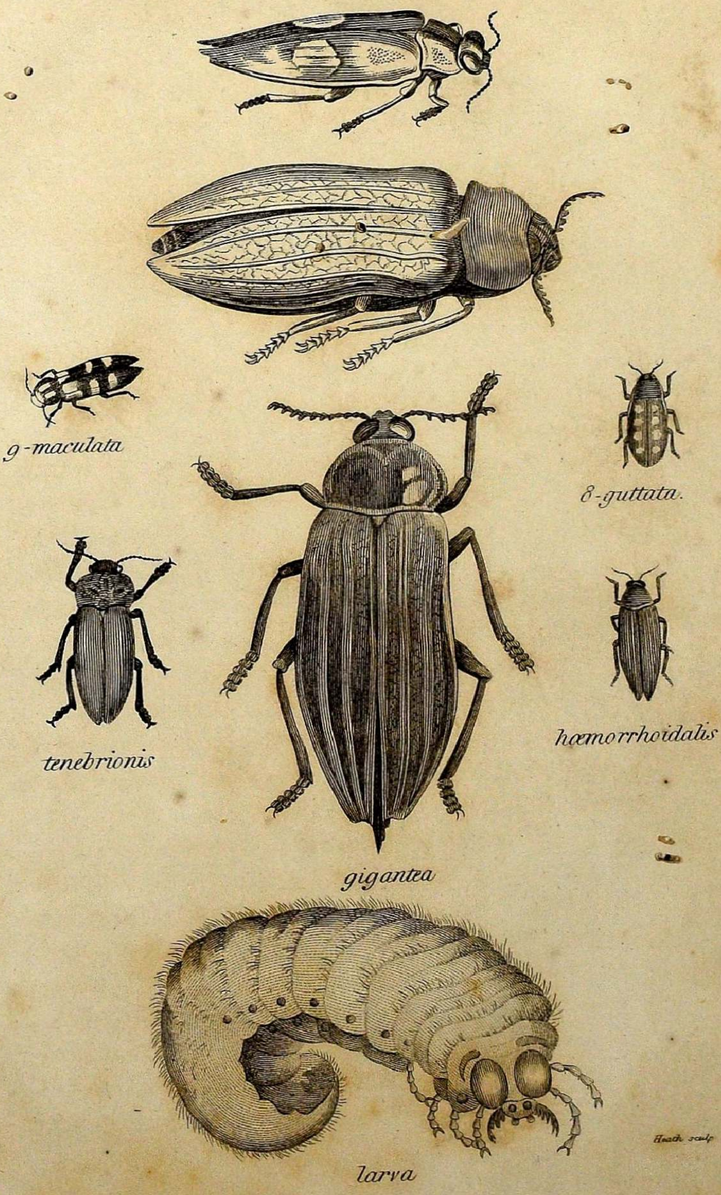
BUPRESTIS. BUPRESTIS.

Generic Character.

Antennæ setaceæ, longitudine thoracis.	*Antennæ* setaceous, of the length of the thorax.
Caput dimidium intra thoracem retractum.	*Head* half withdrawn beneath the thorax.

THE splendid genus Buprestis stands conspicuous among the coleopterous insects, on account of the superior brilliancy of its colours, which, in many of the larger exotic species in particular, shine with a metallic lustre. It is a very numerous genus, but by far the major part of the species are exotic. Among these the *Buprestis gigantea* is the largest hitherto discovered, measuring two inches and a half in length: the thorax is smooth, resembling the colour of polished bell-metal, and the wing-sheaths are of a gilded copper-colour, with a cast of blue-green, and are wrinkled in a longitudinal direction with slight, prominent ramifications. It is a native of India, China, and many other parts of Asia, and is also found in South-America. The large size, metallic colours, and wrinkled surface of the wing-shells in this insect, have induced the Chinese to attempt imitations of it in bronze, in which they succeed

BUPRESTIS.



1805. Oct.r 1 London Published by G. Kearsley Fleet Street

so well that the copy may be sometimes mistaken for the reality. This fine insect proceeds from a large white larva, much resembling that of the Lucanus Cervus or Great Stag-Chaffer, and which feeds, according to Madam Merian, who has figured it in her celebrated work on the Insects of Surinam, on the roots of plants of the Convolvulus tribe.

The *Buprestis sternicornis* is considerably smaller than the former species, and of a thicker shape: it is of the most brilliant golden-green colour, marked with numerous impressed points, which are sometimes whitish: the thorax is still brighter, marked above by numerous impressed points, and stretched out beneath into a conical process. It is a native of India.

The *Buprestis Chrysis* of Fabricius is so much allied to the sternicornis in shape and size, that it has by some been considered rather as a variety than truly distinct: it differs however materially in the colour of the wing-sheaths, which are of the richest reddish chesnut-brown, while the thorax, as in the former, is of a brilliant gold-colour, with a cast of green. It is a native of India.

Buprestis vittata of Fabricius is a species of a more slender shape than the two immediately preceding, and is of a bright gold-green colour, with a broad band of the most brilliant reddish gold-colour running down each of the wing-sheaths: this also is a native of India.

The European insects of this genus fall far short of the Indian and American species both in

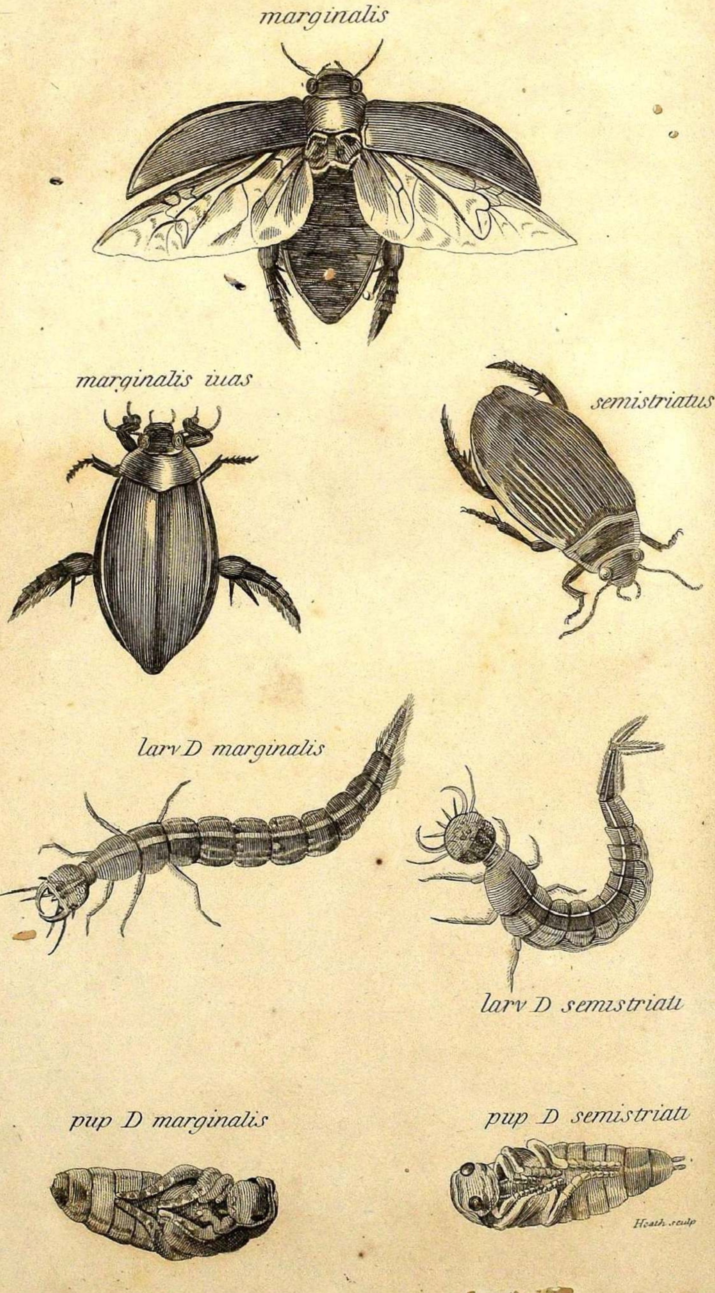
point of size and splendor, though among them may be numbered several elegant insects.

One of the largest is the *Buprestis rustica*, measuring about half an inch or rather more, and of a coppery colour, with several longitudinal furrows along the wing-shells, the thorax being of a deep blue-green, with numerous impressed points: it is found in woods.

Buprestis salicis of Fabricius is much smaller, but of brighter colours; the wing-sheaths being of a reddish gold-colour, inclining to green towards the sutures, and the thorax bright green, with two impressed blue spots: it is sometimes found on willows.

DYTISCUS.

33



1805 Oct 1 London Published [illegible] Kearsley Fleet Street

DYTISCUS. DYTISCUS.

Generic Character.

Antennæ setaceæ.	*Antennæ* setaceous.
Pedes postici villosi, natatorii, submutici.	*Hind-Legs* villose, formed for swimming, and terminated by scarcely visible claws.

THIS, like the Gyrinus, is an aquatic genus, and is rarely seen in flight, except during the evening. It is distinguished by having setaceous antennæ of the length of the thorax, an oval body, pointed behind, a bifid sternum, and the hind-legs formed entirely for swimming, being tapered towards the point, and beset on each side with fine, strong, close-set hairs, enabling them to perform the office of oars.

One of the largest European species is the *Dytiscus marginalis,* which usually measures somewhat more than an inch in length, and is of a blackish olive-colour, with the thorax and wing-sheaths bordered with yellow or ochre-colour: the whole insect is of a polished surface on the upper part, and the wing-shells are each marked by two rows of scarcely perceptible impressed points: the under parts are ochre-coloured. This insect is not uncommon in stagnant waters, where its larva

also resides, which is of a very extraordinary shape, and is so utterly unlike the animal into which it is at length transformed, that no one inconversant in the history of insects would suppose it to have the most distant relationship to it; since it much more resembles the insects of the shrimp tribe, and by the older writers, as Mouffet, Aldrovandus, &c. has actually been referred to that tribe of animals, under the title of Squilla aquatica. It measures, when full-grown, about two inches and a half in length, and is of a pale yellowish brown colour, with a high degree of transparency: the head is very large, somewhat flattened, and furnished in front with a pair of very strong, curved forceps, which, when magnified, appear to be perforated at the tips by an oblong hole or slit, through which the animal sucks the juices of its prey: the legs are slender, of moderate length, and placed on each side the thorax, the abdomen being lengthened out to a very considerable extent, and finely fringed or ciliated on each side the tail, which terminates in a most elegantly divided fin or process. This larva is of a bold and ferocious disposition, committing great ravages, not only among the weaker kind of water-insects, as well as water-newts, tadpoles, &c. but even among fishes, of which it frequently destroys great numbers in a season, and is therefore justly considered as one of the most mischievous animals that can infest a fish-pond. A larva of this kind has been known to seize on a young Tench of three inches in length, and to kill it in the

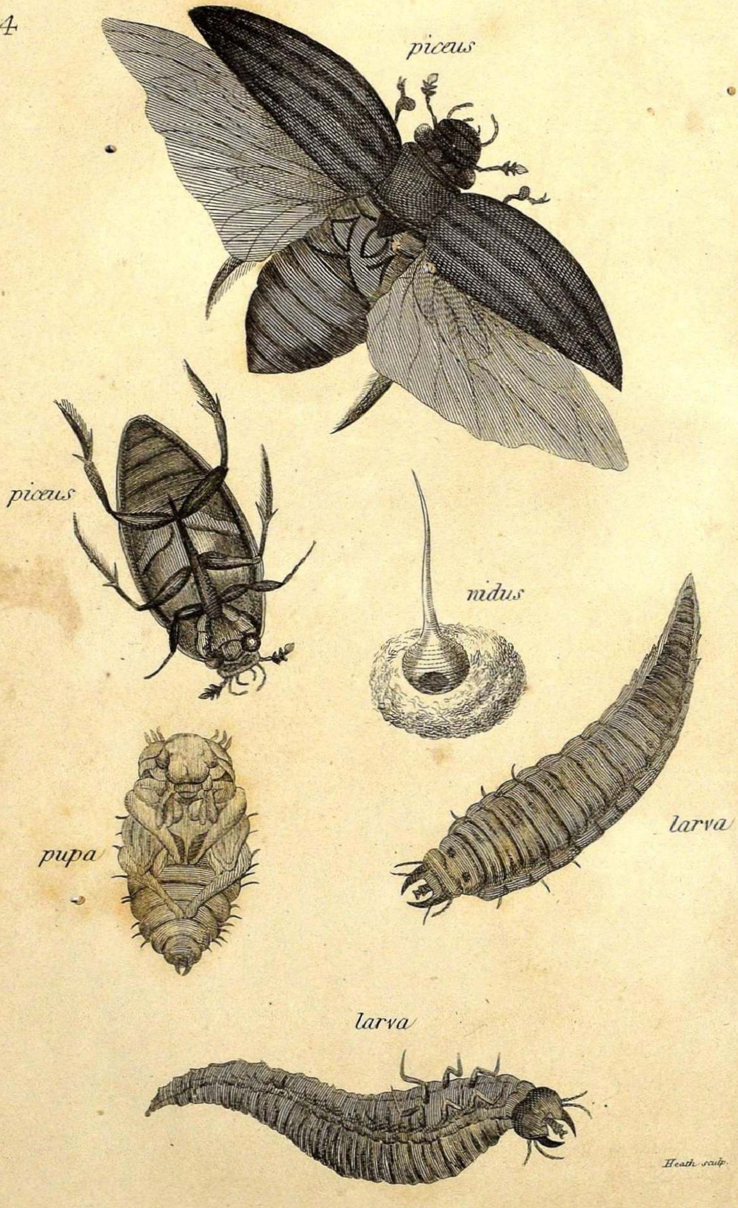
space of about a minute; and even the Banstickle itself, which is so great a destroyer of the small fry of fishes, and so well armed for defence, is notwithstanding a prey to this devouring insect, which seizes it with violence, and very quickly destroys it. When arrived at its full growth, the larva betakes itself to the banks of the water it inhabits, and forming itself an oval hollow in the soft earth or clay, in a few days changes into a chrysalis much resembling that of the genus Scarabæus, and of a whitish colour. From this, in the space of about three weeks, proceeds the complete insect. The male, which has been described above, is distinguishable not only by the smoothness of the wing-sheaths, but by the far superior breadth of the fore-feet, which are expanded near the tips into a broad oval dilatation, concave on the lower surface: the female, instead of being smooth, has the wing-shells marked from about the middle to the tips with numerous deeply-impressed longitudinal furrows.

Dytiscus cinereus is a much smaller species, and of a broader shape in proportion: the male is of a blackish olive-colour, with an ochre-coloured band across the thorax, which, as well as the smooth wing-shells, is edged with ochre-colour, while the female has those parts of a dull ash-colour, strongly marked by several longitudinal furrows. The larva of this species is of the same general form with that of the preceding, but proportionally smaller, and with a longer neck. It is not uncommon in stagnant waters.

Many other much smaller species of this genus may be found in ponds and slow-running waters. Mr. Marsham, in his Entomologia Britannica, enumerates not less than forty-nine British Dytisci; so rapid has been the increase of entomological discovery within these few years past!

HYDROPHILUS.

34



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HYDROPHILUS. HYDROPHIL.

Generic Character.

Antennæ clavato-perfoliatæ. *Pedes* postici villosi, natatorii.	*Antennæ* clavate-perfoliate. *Hind-Legs* villose, formed for swimming.

THIS genus differs from that of Dytiscus only in the structure of the antennæ, which, instead of being setaceous, are short, and furnished with a clavated and perfoliated tip or knob.

The principal European species, which is not an uncommon insect in our own country, is the *Hydrophilus piceus,* perhaps the largest of the British Coleoptera, if we except the Lucanus Cervus; measuring nearly an inch and half in length. It is entirely black, and of a smooth surface, and is particularly distinguished by the form of its thorax, which is produced beneath into a very long and sharp-pointed spine, stretching to a considerable distance down the abdomen: the hind-legs are furnished on each side with strong, but very fine hairs, as in the Dytisci, which the animal resembles in its manners. It is a native of stagnant waters, where its larva is principally

observed to prey on the smaller kind of water-snails, and is distinguished by a particularity in the highest degree remarkable: this consists in the apparently anomalous situation of the legs, which seem, unless very accurately considered, to be placed, not beneath the thorax, as in other insects, but on the upper part, and from thence to be deflected towards the sides. This uncommon appearance however is not owing to a real dorsal insertion of the legs, but principally to the peculiar shape and position of the head; and the deception is so much heightened by the inverted posture in which the insect generally swims and rests, that it is by no means easy, even for the most scientific observer, to divest himself of the erroneous idea before-mentioned. Frisch, in his History of Insects, appears to have been completely convinced of the reality of the dorsal insertion of the legs; and the celebrated Reaumur, having discovered something similar in another aquatic insect, was so struck with the unusual appearance, that he has commemorated it as a circumstance unparalleled in the animal world. The author of the fourth volume of Seba's Thesaurus was of the same opinion, and expressly warns his readers that his engraver, thinking to rectify what he supposed an erroneous drawing, has represented the legs in this larva as situated beneath the thorax and not on the upper part. The sagacious Lyonet, in his observations on Lesser's "Theologie des Insectes," seems to have been the first who detected the

common error, and ascertained the real structure of the animal, which he has clearly and satisfactorily explained.

The larvæ of the Hydrophils are supposed to remain about two years before they change into pupæ or chrysalides. When the larva is arrived at its full growth, it secretes itself in the bank of the water it inhabits, and having formed a convenient cavity or cell, lies dormant for some time, after which it divests itself of its skin, and appears in the form of a chrysalis, in which state having continued for some time longer, it again delivers itself from its exuviæ, and appears in its complete or beetle form. When first disengaged from the skin of the chrysalis, it is of a pale colour, and very tender; but in the space of a few hours the elytra or wing-cases acquire a degree of strength and colour, which gradually grows more and more intense, till the animal, finding itself sufficiently strong, comes forth from its retreat, and commits itself in its new form to the waters.

The male is distinguished from the female by the structure of the fore-legs, which, as in the genus Dytiscus, are furnished, near the setting on of the feet, with a sort of horny, concave flap or shield; the legs of the females being destitute of this part. The structure of the hind-legs is finely calculated for the animal's aquatic mode of life, being furnished on the inside with a series of close-set filaments, so as to give a sort of finny appearance to the legs, and to enable the animal to swim with the greatest ease and celerity. It may be added,

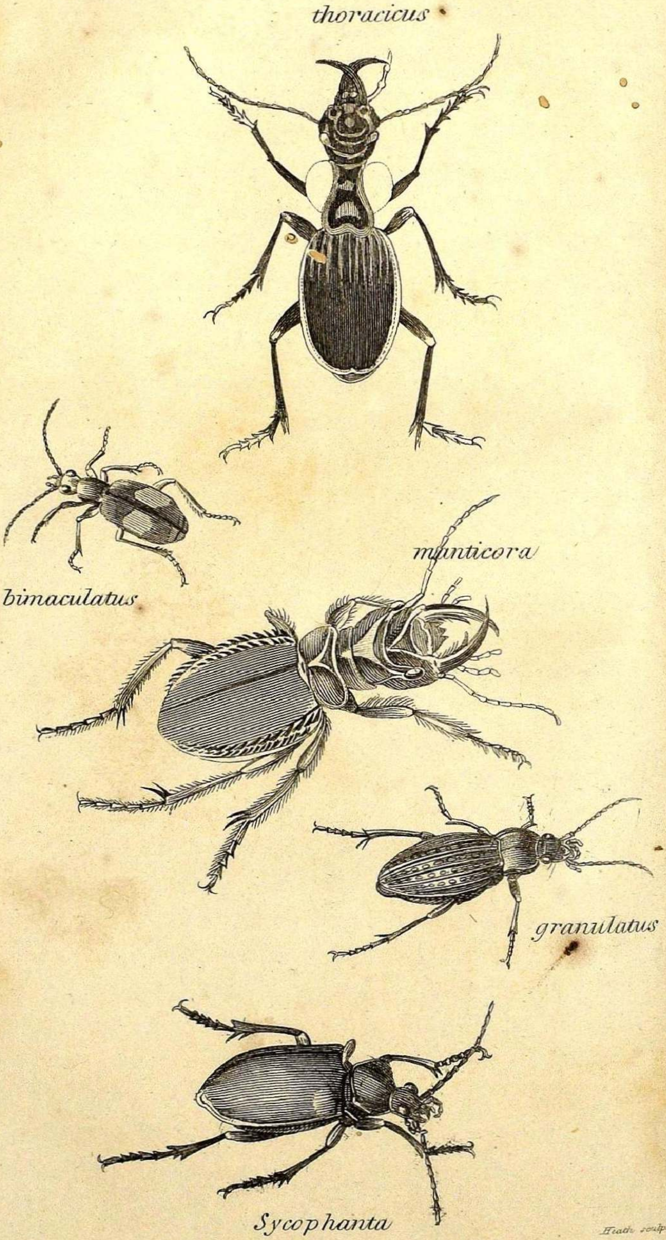
that the female of the Hydrophilus piceus affords an example of a faculty which seems to be exercised by no other coleopterous insect; viz. that of spinning a kind of web or flattish circular case of silk, which it leaves floating on the water, and in which it deposits its eggs. This case is terminated on its upper surface by a lengthened conical process resembling a horn, of a brown colour, and of a much stronger or denser nature than the case itself, which is white. The young larvæ, as soon as hatched, make their escape from the envelopement of the case, and commit themselves to the water. This curious particular in the history of the Hydrophilus piceus was first discovered by Lyonett.

The *Hydrophilus caraboides* is a species measuring about three quarters of an inch in length, and is of a polished black colour, and of an oval shape. Like the former, it inhabits stagnant waters, where its highly curious larva, admirably figured in the works of Roesel, may not unfrequently be found: it is fringed along the sides with numbers of separate plumes or feather-formed branchiæ.

The genus Hydrophilus, like that of Dytiscus, has been greatly increased by the persevering researches of modern entomologists. Mr. Marsham enumerates twenty-eight British species.

It may be added that the Hydrophili, like the Dytisci, sometimes emerge from the waters, and fly about the fields, and thus migrate occasionally from water to water; but as this happens chiefly by night, it is not generally observed.

CARABUS.



Heath sculp.

1805, Oct. 1. London, Published by G. Kearsley, Fleet Street.

CARABUS. CARABUS.

Generic Character.

Antennæ setaceæ.	*Antennæ* setaceous.
Thorax obcordatus, apice truncatus, marginatus.	*Thorax* somewhat heart-shaped, truncated in front, margined.
Abdomen ovatum.	*Abdomen* ovate.
Elytra marginata.	*Wing-sheaths* margined.

THE insects belonging to this genus are very numerous, and many species are found in our own country. Among these one of the largest is the *Carabus hortensis*, so named from its being frequently seen in gardens and pathways. It is about an inch in length, and of a dark brassy-green colour, with the wing-shells obscurely marked by three longitudinal rows of impressed points, while the edges are often of a shining purple or violet-colour.

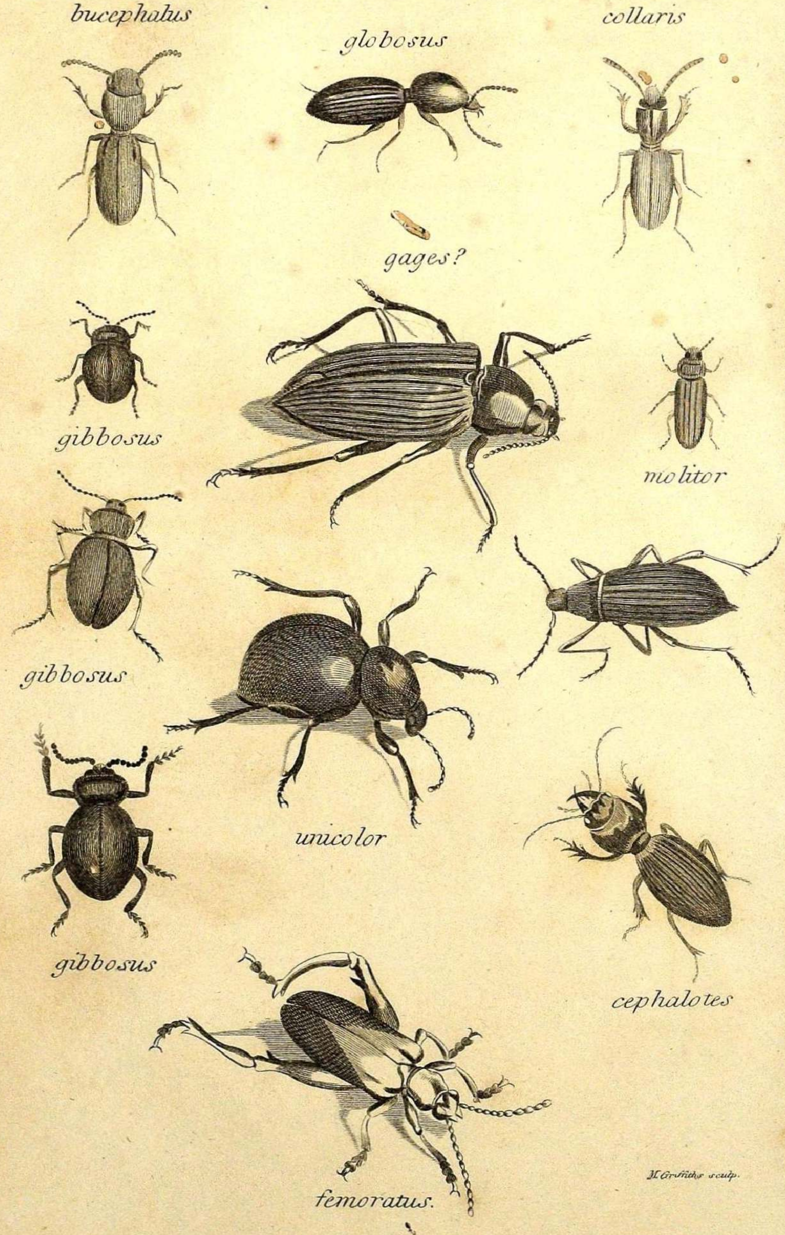
Carabus violaceus is extremely like the preceding, but is a size larger, of a black colour, and wants the three impressed lines on the wing-sheaths: the sides of the thorax and wing-sheaths are frequently tinged with a shining purple or violet-colour as in the former. It is found in woods and damp places.

Among the smaller species the *Carabus cupreus* is a very frequent insect, being seen almost every where during the summer months in gardens, dry pathways, &c. generally running, like the rest of this genus, with a very brisk motion: its usual length is about half an inch, and its colour coppery-olive, varying in different specimens into gold-green, brassy, purple, &c. &c.

The British species of Carabus, according to Mr. Marsham, amount to no less than a hundred and nine, and in this as well as in most other genera, we may well suppose that many are yet undescribed.

In many parts of Europe, as in Germany, France, &c. is found a species of middling size, and which is known among entomologists by the title of *Carabus crepitans:* it is thus named from the extraordinary faculty which it possesses of discharging from behind, on being pursued or irritated, a blueish, fetid, and penetrating vapour, accompanied by a very smart explosion: this operation it has the power of repeating ten, twelve, or even twenty times in succession, with equal violence, thus frequently escaping by terrifying its pursuers. This insect is said to be often pursued, and sometimes preyed upon by a larger species of Carabus, against the attacks of which the peculiar faculty above-described is singularly successful. From some late observations it appears that some exotic species of this genus have a similar power in a still higher degree, being of a much greater size than the European insect.

TENEBRIO.



M. Griffiths sculp.

1805, Oct.r 1 London, Published by G. Kearsley, Fleet Street.

TENEBRIO. TENEBRIO.

Generic Character.

Antennæ moniliformes, articulo ultimo subrotundo.	*Antennæ* moniliform, with the last joint rounded.
Thorax plano-convexus, marginatus.	*Thorax* plano-convex, margined.
Caput exsertum. *Elytra* rigidiuscula.	*Head* exserted. *Wing-sheaths* stiffish.

In this genus the body is oblong-oval, and in most species somewhat pointed at the extremity: it may be observed also that several species are destitute of wings. Among the European Tenebriones one of the most remarkable is the *Tenebrio mortisagus*, a coal-black insect measuring about an inch in length, of rather slow motion, and distinguished by the remarkably pointed appearance of the wing-sheaths, which at their extremities project a little beyond the abdomen: they are also perfectly connate or undivided, forming a complete covering to the body, and being carried over the sides to some distance beneath, and the insect is totally destitute of real or under wings. It is usually found in dark neglected places, beneath boards, in cellars, &c. and if handled, and

especially if crushed, diffuses a highly unpleasant smell.

Tenebrio globosus is perhaps not a Linnæan species, unless it be the T. gibbosus of that author. It is seen during the hottest part of the summer about walls and pathways, and is distinguished by the remarkably globular appearance of the body: it is totally black, the under parts having sometimes a slight violaceous cast, and the joints of the feet, which are remarkably broad, are of a dull brown: the whole insect is of a very smooth, but not polished surface, and usually measures about three quarters of an inch in length: in this however it varies considerably, some specimens, probably the males, being considerably smaller: the antennæ in this insect are beautifully moniliform, all the joints being globular.

Tenebrio molitor is an insect often seen in houses: it is one of the smaller kinds, and is coal-black, of a lengthened shape, with longitudinally striated wing-shells, and proceeds from a larva commonly known by the name of the Meal-Worm, from its being so frequently found in flour, &c. it is of a yellowish white colour, about an inch long, slender-bodied, and of a highly polished surface, and is considered as the favorite food of the Nightingale when kept in a state of captivity: it is said to remain two years before it changes into a chrysalis.

The genus Tenebrio is numerous, and some of the exotic species much resemble the general ap-

pearance of the first described kind, but are much larger: many others are small insects, and the genus has received such ample accessions from the discoveries of later entomologists, that it is by Fabricius and others divided into several distinct genera, under the titles of Pimelia, Blaps, Alurnus, &c.

MELOE. MELOE.

Generic Character.

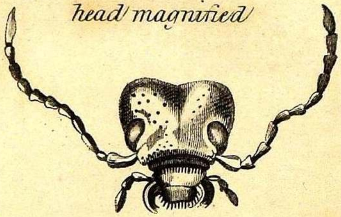
Antennæ moniliformes, articulo ultimo ovato.
Thorax subrotundus.
Elytra mollia, flexilia.
Caput inflexum.

Antennæ moniliform, with the last joint ovate.
Thorax roundish.
Wing-Sheaths soft, flexile.
Head inflected.

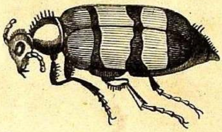
AMONG the principal species of Meloe may be numbered the *Meloe Proscarabæus,* commonly called the *Oil-Beetle.* It is of considerable size, often measuring near an inch and half in length: its colour is violet-black, especially on the antennæ and limbs: the wing-sheaths are very short, in the female insect especially, scarcely covering more than a third of the body, and are of an oval shape: this species is frequent in the advanced state of spring in fields and pastures, creeping slowly, the body appearing so swoln or distended with eggs as to cause the insect to move with difficulty. On being handled it suddenly exsudes from the joints of its legs, as well as from some parts of the body, several small drops of a clear, deep-yellow oil or fluid, of a very peculiar and penetrating smell. This oil or fluid has been highly celebrated for its supposed efficacy in rheumatic pains, &c. when

MELOE.

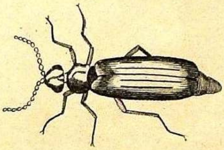
head magnified



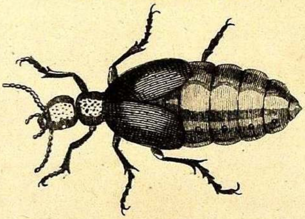
cichorei



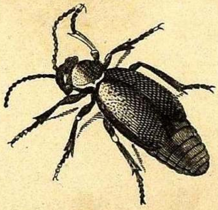
vescatorius

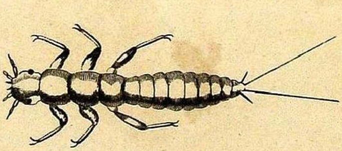


Proscarabœus fem.



Proscarabœus mas.





Heath sculp

young larva magnified

1805, Oct. 1 London, Published by G. Kearsley, Fleet Street.

used as an embrocation on the parts affected: for this purpose also the oil expressed from the whole insect has been used with equal success. The female of this species deposits her eggs, which are very small, and of an orange colour, in a large heap or mass beneath the surface of the ground: each egg, when viewed by the microscope, appears of a cylindric shape, with rounded ends: from these are hatched the Larvæ, which, at their first appearance, scarcely measure a line in length, and are of an ochre-yellow, with black eyes: they are furnished with short antennæ, six legs of moderate length, and a long, jointed, tapering body, terminated by two forking filaments or processes. These larvæ are found to live by attaching themselves to other insects and absorbing their juices. They are sometimes seen strongly fastened to common flies, &c. a practice so extraordinary as to have caused considerable doubt whether they could possibly have been the real larvæ of the Meloe Proscarabæus. The accurate observations of Degeer however have completely proved that they immediately fasten themselves to any insect, whether living or dead, that is placed near them. It is therefore probable that in their natural subterraneous state they attach themselves in a similar manner to the larvæ of the larger beetles, worms, &c. &c.

The *Meloe scabrosus** extremely resembles the preceding, and is found in similar situations, but

* Marsham Entom. Britann.

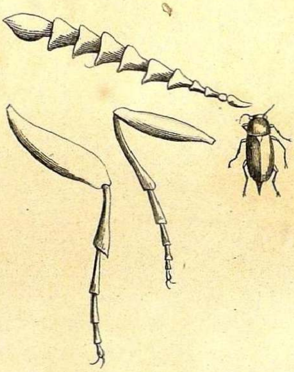
differs in being of a reddish purple colour, with a cast of deep gilded green.

Meloe vesicatorius, Blister-Fly, or Spanish-Fly, is an insect of great beauty, being entirely of the richest gilded grass-green, with black antennæ. Its shape is lengthened, and the abdomen, which is pointed, extends somewhat beyond the wing-sheaths: its usual length is about an inch. This celebrated insect, the *Cantharis* of the Materia Medica, forms, as is well known, the safest and most efficacious epispastic or blister-plaister, raising, after the space of a few hours, the cuticle, and causing a plentiful serous discharge from the skin. It is supposed however that the Cantharis of Dioscorides, or that used by the ancients for the same purpose, was a different species, viz. the *Meloe Cichorei** of Linnæus, an insect nearly equal in size to the M. Proscarabæus, and of a black colour, with three transverse yellow bands on the wing-shells. The Meloe vesicatorius is principally found in the warmer parts of Europe, as Spain, the South of France, &c. It is also observed, though far less plentifully, in some parts of our own country.

* See a dissertation on this subject in the sixth volume of the Amoenitates Academicæ. The Chinese still use it instead of our Cantharides.

MORDELLA.

M. aculeata, with antenna & legs magnified



perlata.

bicolor.

Heath. sculp.

1805, Oct. 1 London, Published by G. Kearsley, Fleet Street.

MORDELLA. MORDELLA.

Generic Character.

Antennæ filiformes serratæ.	*Antennæ* filiform, serrated.
Caput deflexum in territo.	*Head* bent down, when disturbed.
Palpi compresso-clavati, oblique truncati.	*Feelers* compressed-clavate, obliquely truncated.
Elytra deorsum curva apicem versus.	*Wing-Sheaths* curving downwards towards the tip.
Lamina lata ante femora ad basin abdominis.	*Lamina* broad, before the thighs, at the base of the abdomen.

THE present genus consists of but few species, and those of small size. The most common of the British species is the *Mordella aculeata*, measuring two or three lines in length: it is entirely black, and of a smooth surface; the abdomen is compressed, and terminates in a spine or sharp process extending beyond the wing-sheaths; the legs are rather long, and the insect, when disturbed, has the power of leaping or springing to a small distance. It is usually found on plants, in gardens, &c. It is observed to vary occasionally in colour, having the wing-sheaths sometimes marked by two transverse, cinereous, villose bars. This supposed variety is by some considered, and perhaps justly, as a distinct species.

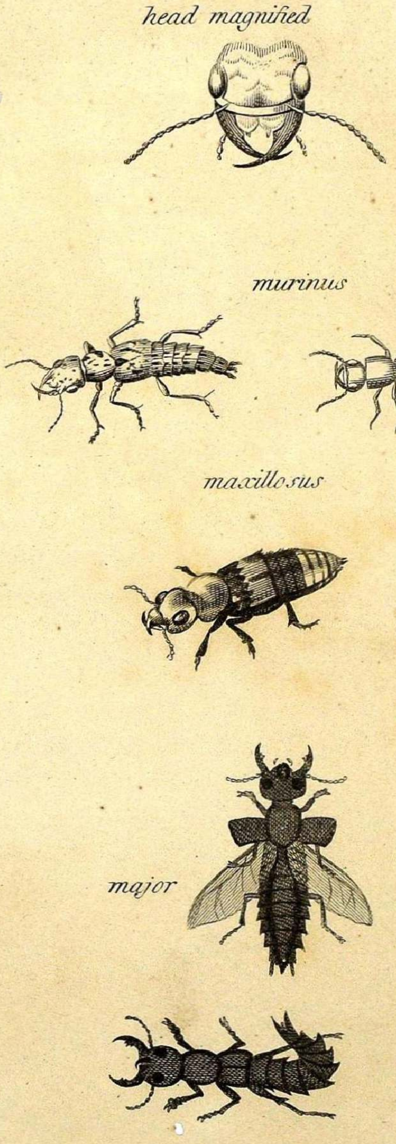
STAPHYLINUS. STAPHYLINUS

Generic Character.

Antennæ moniliformes.	*Antennæ* moniliform.
Elytra dimidiata. *Alæ* tectæ.	*Wing-Sheaths* halved. *Wings* covered.
Cauda simplex, exserens duas vesiculas oblongas.	*Tail* simple, protruding occasionally two oblong vesicles.

IN the genus Staphylinus, which is pretty numerous, the wings, which are rather large, are curiously pleated or convoluted beneath the short, abruptly terminated wing-sheaths. The larger species are of an unpleasing appearance, and generally run with considerable swiftness. One of the most remarkable, as well as the largest of the British species, is the *Staphylinus major* of Degeer, which is more than an inch long, entirely of a deep black colour, and when disturbed, sets up the hinder part of its body, as if in a posture of defence: it is very frequently seen, during the autumnal season, about sunny pathways, fields, and gardens, and is furnished with a large head, and very strong, forcipated jaws. This species has often been quoted as the Staphylinus maxillosus of Linnæus, but it appears from late observations to be a larger, and totally distinct species from that insect.

STAPHYLINUS.



Heath. sculp.

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Staphylinus erythropterus is smaller than the preceding, and is readily distinguished by the colour of its wing-sheaths, which are of a dull brick-red: it is found about dunghills and in damp places.

Staphylinus murinus is rather smaller than the erythropterus, and is of a dull blackish colour, clouded with obscure, ash-coloured, villose bands and spots.

The Staphylini are of a predacious nature, living on the smaller insects, worms, &c. Their larvæ are subterraneous, and bear a considerable resemblance to the complete animals. The British species, according to Mr. Marsham's Entomologia Britannica, amount to no fewer than eighty-seven.

FORFICULA. EARWIG.

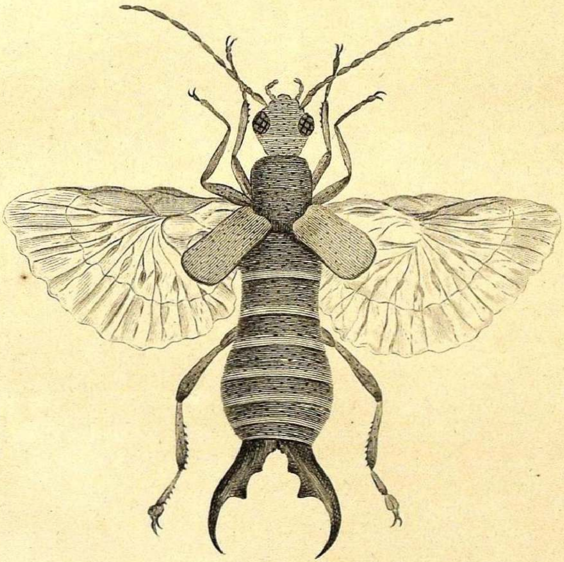
Generic Character.

Antennæ setaceæ.	*Antennæ* setaceous.
Elytra dimidiata. *Alæ* tectæ.	*Wing-Sheaths* halved. *Wings* covered.
Cauda forcipata.	*Tail* forcipated.

THIS is not a numerous genus. The *Forficula auricularia* or common Earwig is an insect so familiarly known that a formal description might seem unnecessary: its structure however is highly curious, and its natural history well worthy of particular observation: the wings of this insect are remarkably elegant, and are convoluted beneath their small sheaths in so curious a manner that they cannot be viewed without admiration: they are very large in proportion to the animal, transparent, and slightly iridescent. The earwig flies only by night, and it is not without great difficulty that it can be made to expand its wings by day: it is even probable that they would receive injury by any long exposure to the diurnal air; the animal therefore keeps them completely covered; and indeed so unusual a circumstance is it to see them expanded, that Sir Thomas Brown, in his *Pseudodoxia Epidemica*, has thought it neces-

FORFICULA.

F. auricularia magnified.



eggs & newly-hatched young

M. Griffiths sculp.

1805 Oct.r 1 London Published by G. Kearsley Fleet Street.

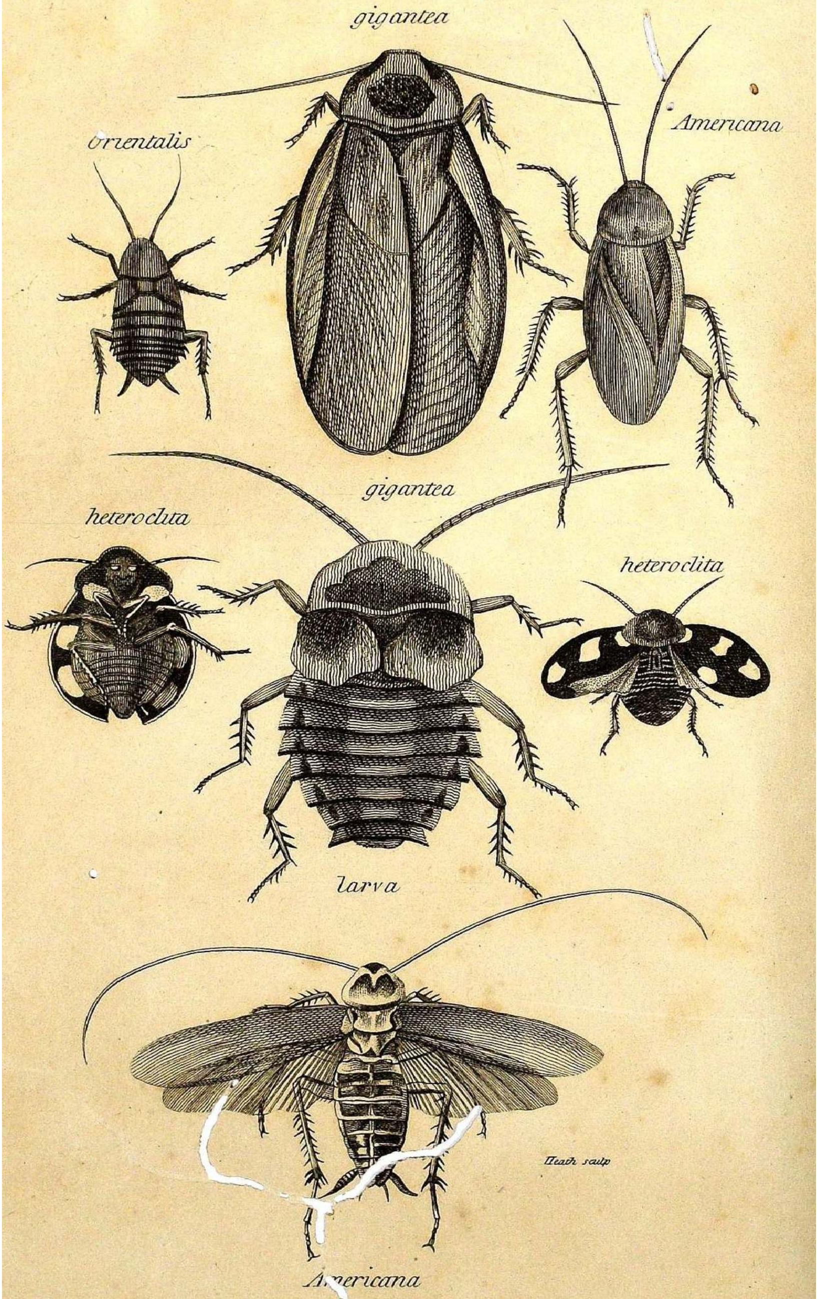
sary to confute the commonly received opinion that the Earwig is an "impennous insect."

The female Earwig deposits her eggs, which are rather large for the size of the animal, of a white colour, and of an oval shape, under stones or in any damp situation, where they may be secure from too much heat or drought. From these eggs are hatched the young larvæ, which are at first very small, but have very much the general aspect of the parent animal, except that they are of a white or whitish colour, and that the limbs of the forceps at the tip of the abdomen are not yet curved inwards. The parent insect, according to the observations of Degeer, guards, and broods over her young nearly in the same manner as a hen does over her chickens; and they generally remain close to the sides, or under the abdomen of the parent for several hours in the day. They change their skin at certain intervals during the earlier stages of their growth; and after each change acquire a darker colour and a greater degree of resemblance to the full-grown insect; till at length the wing-sheaths and wings are formed, and the animals may be considered as perfect.

The usual food of the earwig consists of decayed fruit, and other vegetable substances, and it does not seem to be naturally carnivorous, though, if kept without proper nourishment, it will, like many other animals, occasionally attack and devour even its own species.

The popular dread in which this insect is held, on a supposition of its sometimes entering the cavity of the ear, and piercing the tympanum, is now generally considered as an ancient and vulgar error.

BLATTA.



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INSECTS.

ORDER

HEMIPTERA.

BLATTA. COCKROACH.

Generic Character.

Caput inflexum.	*Head* inflected.
Antennæ setaceæ.	*Antennæ* setaceous.
Alæ planæ, subcoriaceæ.	*Wings* flat, subcoriaceous.
Thorax planiusculus, orbiculatus, marginatus.	*Thorax* flattish, orbicular, margined.
Pedes cursorii.	*Feet* formed for running.
Cornicula duo supra caudam.	*Hornlets* two over the tail.

THIS is a genus containing many very destructive and disagreeable insects, and which form one of the principal inconveniences of the hotter climates. They devour various animal and vegetable substances, and some species are of a highly unpleasant smell, which is apt to remain on such

articles as they have passed over. The largest of the genus is the *Blatta gigantea* of Linnæus, which is a native of many of the warmer parts of Asia, Africa, and South-America. It is this species in particular which seems to be intended in the following description of the ravages of this genus by an excellent observer who had contemplated the animals in their native climes.

"The Cockroaches* are a race of pestiferous beings, equally noisome and mischievous to natives or strangers, but particularly to collectors. These nasty and voracious insects fly out in the evenings and commit monstrous depredations: they plunder and erode all kinds of victuals, drest and undrest, and damage all sorts of cloathing, especially those which are touched with powder, pomatum, and similar substances; every thing made of leather, books, paper, and various other articles, which if they do not destroy, at least they soil, as they frequently deposit a drop of their excrement where they settle, and some way or other by that means damage what they cannot devour. They fly into the flame of candles, and sometimes into the dishes; are very fond of ink and of oil, into which they are apt to fall and perish. In this case they soon turn most offensively putrid, so that a man might as well sit over the cadaverous body of a large animal as write with the ink in which they have died. They often fly into persons' faces or bosoms, and their legs

* See the preface to the third volume of Drury's Exotic Insects.

being armed with sharp spines, the pricking excites a sudden horror not easily described. In old houses they swarm by myriads, making every part filthy beyond description wherever they harbour, which in the day-time is in dark corners, behind all sorts of cloaths, in trunks, boxes, and in short every place where they can lie concealed. In old timber and deal houses, when the family is retired at night to sleep, this insect, among other disagreeable properties, has the power of making a noise which very much resembles a pretty smart knocking with the knuckle upon the wainscotting. The Blatta gigantea of Linnæus in the West Indies is therefore frequently known by the name of the Drummer. Three or four of these noisy creatures will sometimes be impelled to answer one another, and cause such a drumming noise that none but those who are very good sleepers can rest for them. What is most disagreeable, those who have not gauze curtains are sometimes attacked by them in their sleep: the sick and dying have their extremities attacked, and the ends of the toes and fingers of the dead are frequently stripped both of the skin and flesh."

This horrible insect seems to be at present unknown in the European world, though other species have been introduced by ships from the warmer regions, and are become nuisances in our habitations and warehouses: yet, from an observation recorded by Mouffet it should seem that a specimen of the Blatta gigantea had by some

means found its way long ago into our country, since it is hardly possible to apply the description to any other known kind*. "A viris fide dignis accepi Blattam mollem vulgari sextuplo majorem in summo templo Petropoli nostræ captam fuisse, quæ morsu non cutem tantum eam venantium vulnerabat, sed et sanguinem altius copiosiusque eliciebat; erat digiti majoris magnitudine longitudineque, atque loco muris septo inclusa, evasit tamen post triduum; sed qua ratione aut via nemo perspexit."

The *Blatta orientalis* or common black Cockroach, which is frequently called in our metropolis and elsewhere by the erroneous name of the black beetle, is supposed to have been first imported from the Eastern parts of the world, and seems to have made great progress of late years in extending itself throughout the kingdom.

The *Blatta Americana* or American Cockroach, which has long ago been elegantly figured by Madam Merian in her work on the insects of Surinam, is of a light chesnut-colour, and is extremely common in the warmer parts of America and the West-Indian islands: it is somewhat larger than the black or eastern Cockroach.

* "I have heard from persons of good credit that one of these Blattæ was found and taken in the top of the roof of the church at Peterborough, which was six times larger than the common Blatta, and which not only pierced the skin of those who endeavoured to seize it, but bit so deep as to draw blood in great quantity; it was a thumb's length and breadth in size, and being confined in a cavity of the wall, after two or three days made its escape; no one knew how."

The *Blatta heteroclita* is an insect which is of a shorter and rounder shape than the rest of the genus: it is of a black colour, with white spots, and is distinguished by the remarkable circumstance of having three spots on one wing-sheath, and four on the other: it is a native of India.

The eggs in the genus Blatta are deposited in a kind of connate groupe, appearing at first view like a large single ovum.

MANTIS. MANTIS.

Generic Character.

Caput nutans, maxillosum, palpis instructum.

Antennæ setaceæ.

Thorax linearis.

Alæ quatuor, membranaceæ, convolutæ; inferiores plicatæ.

Pedes antici compressi, subtus serrato-denticulati, armati ungue solitario et digito setaceo laterali articulato; *postici* quatuor læves, gressorii.

Head unsteady, armed with jaws, and furnished with palpi or feelers.

Antennæ setaceous.

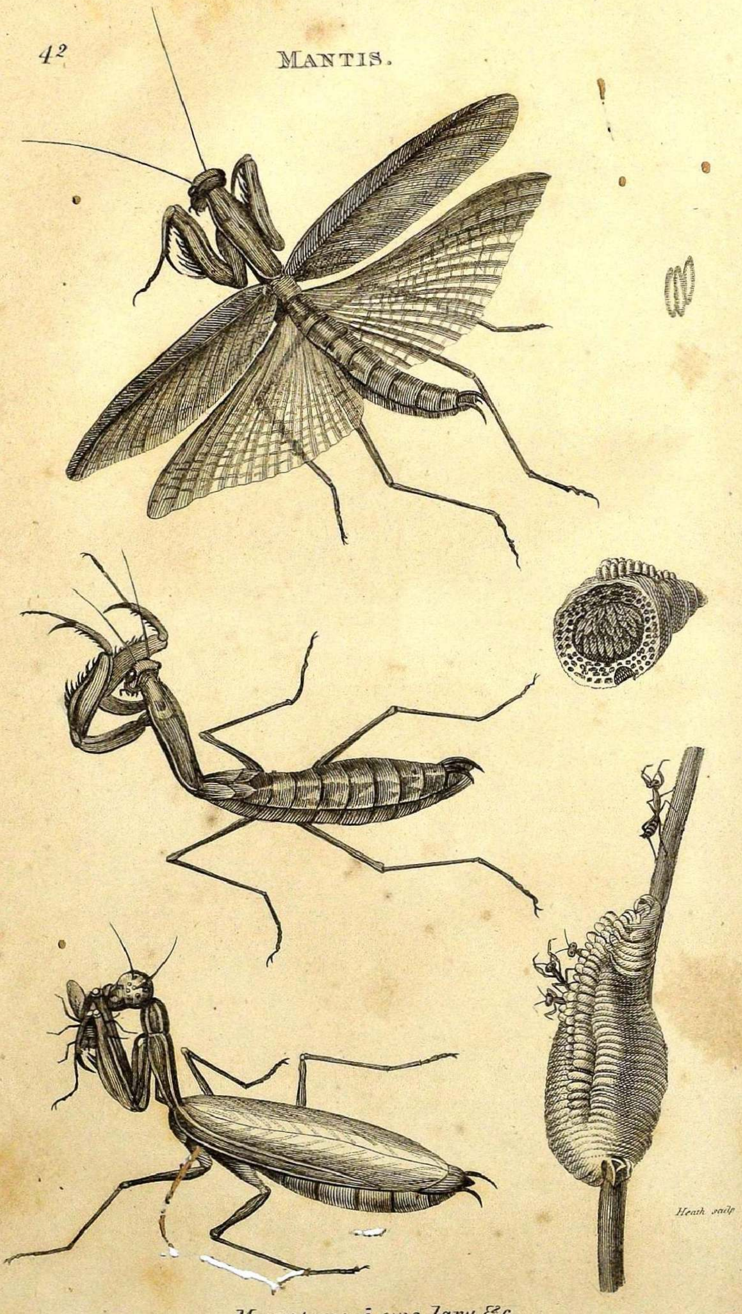
Thorax linear.

Wings four, membranaceous, convoluted; the lower pair pleated.

Fore-legs, in most species, compressed, serrated beneath, and armed with a single claw and a setaceous, lateral, jointed foot. *Hind-legs* smooth, formed for walking.

THIS is one of the most singular genera in the whole class of Insects, and imagination itself can hardly conceive shapes more strange than those exhibited by some particular species.

The chief European kind is the *Mantis oratoria* of Linnæus, or Camel-Cricket, as it is often called. This insect, which is a stranger to the British isles, is found in most of the warmer parts of



M. oratoria, c̄ ovis, larv. &c.

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Europe and is entirely of a beautiful green colour. It is nearly three inches in length, of a slender shape, and in its general sitting posture is observed to hold up the two fore-legs, slightly bent, as if in an attitude of prayer: for this reason the superstition of the vulgar has conferred upon it the reputation of a sacred animal, and a popular notion has often prevailed, that a child or traveller having lost his way, would be safely directed by observing the quarter to which the animal pointed when taken into the hand. In its real disposition it is very far from sanctity; preying with great rapacity on any of the smaller insects which fall in its way, and for which it lies in wait with anxious assiduity in the posture at first mentioned, seizing them with a sudden spring when within its reach, and devouring them. It is also of a very pugnacious nature, and when kept with others of its own species in a state of captivity, will attack its neighbour with the utmost violence, till one or the other is destroyed in the contest. Roësel, who kept some of these insects, observes that in their mutual conflicts their manœuvres very much resemble those of Huzzars fighting with sabres; and sometimes one cleaves the other through at a single stroke, or severs the head from its body. During these engagements the wings are generally expanded, and when the battle is over the conqueror devours his antagonist.

Among the Chinese this quarrelsome property in the genus Mantis is turned into a similar enter-

tainment with that afforded by fighting cocks and quails: (for it is to this insect or one closely allied to it that I imagine the following passage in Mr. Barrow's account of China to allude.) "They have even extended their enquiries after fighting animals into the insect tribe, and have discovered a species of Gryllus or Locust that will attack each other with such ferocity as seldom to quit their hold without bringing away at the same time a limb of their antagonist. These little creatures are fed and kept apart in bamboo cages, and the custom of making them devour each other is so common that, during the summer months, scarcely a boy is to be seen without his cage of Grasshoppers." *Barrow's Travels in China, p.* 159.

The *Mantis precaria* is a native of many parts of Africa, and is the supposed idol of the Hottentots, which those superstitious people are reported to hold in the highest veneration, the person on whom the adored insect happens to light being considered as favoured by the distinction of a celestial visitant, and regarded ever after in the light of a saint. This species is of the same general size and shape with the M. oratoria, and is of a beautiful green colour, with the thorax ciliated or spined on each side, and the upper wings each marked in the middle by a semitransparent spot.

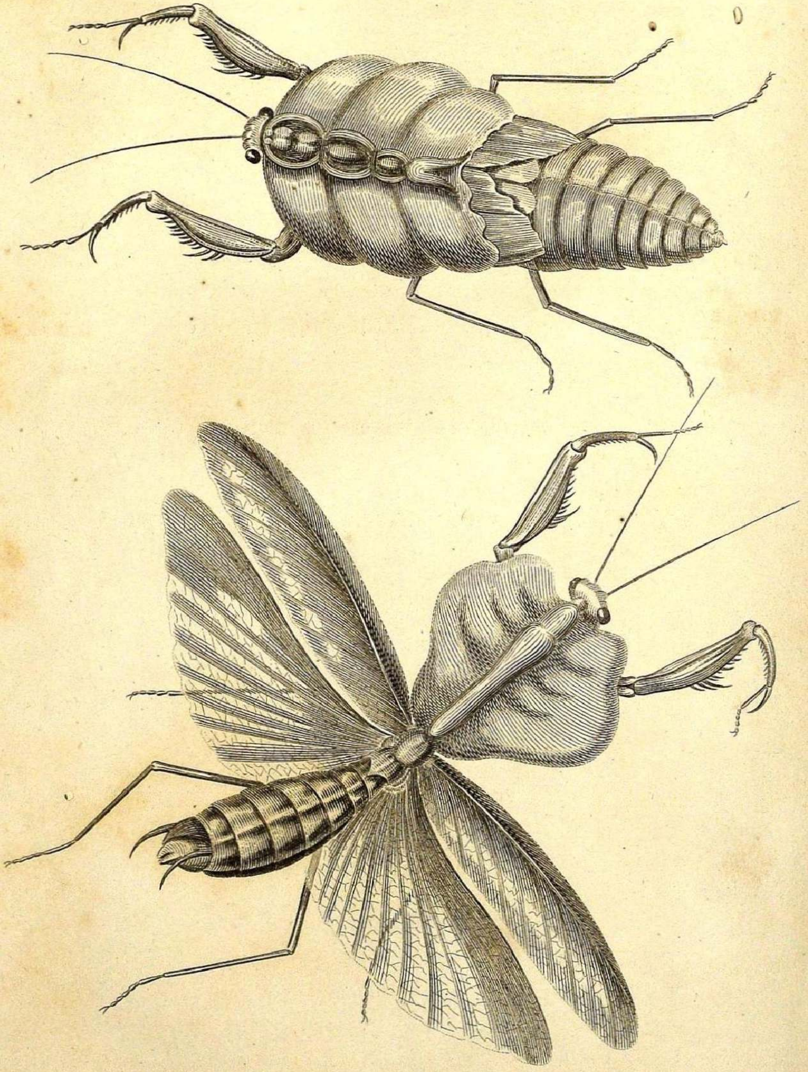
Of all the Mantes perhaps the most singular in its appearance is the *Mantis gongylodes* of Linnæus, which, from its thin limbs, and the grotesque form of its body, especially in its dried

M. gongyloides

M. Griffiths. sculp.

1803 Octr 1st London Published by G. Kearsley Fleet Street.

MANTIS.



Heath sculp

M. strumaria c̄ larva.

1805 Oct 1 London, Published by G Kearsley, Fleet Street

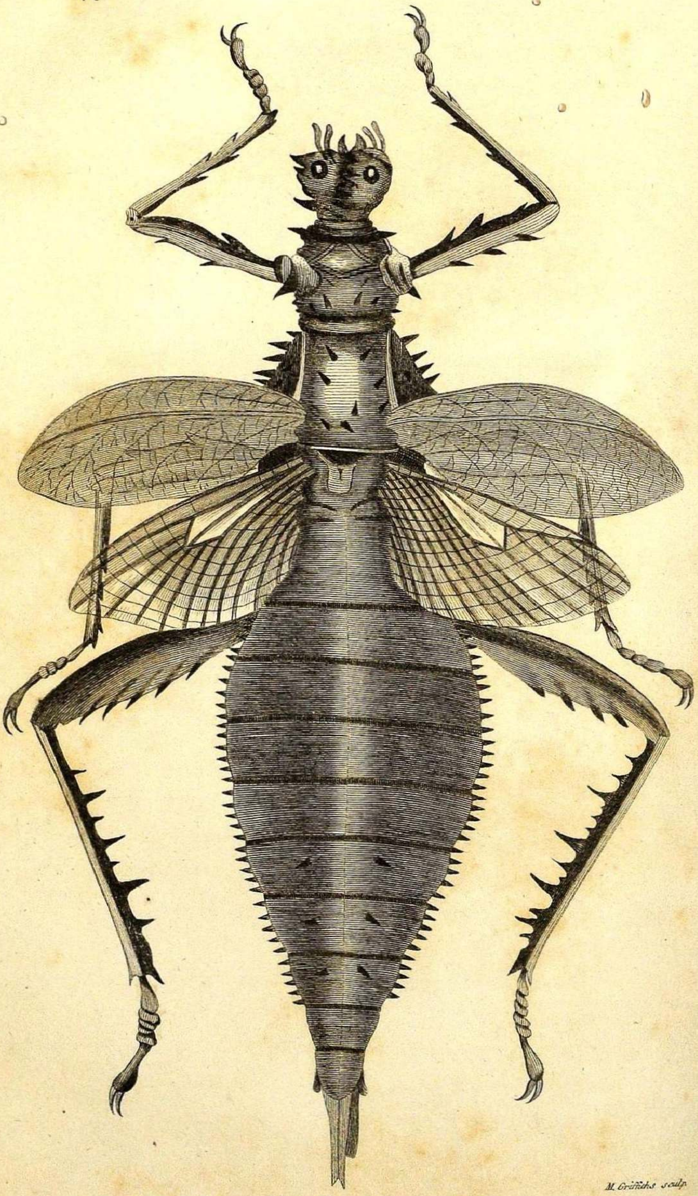
state, seems to resemble the conjunction of several fragments of withered stalks, &c. This also is the case with the larvæ of many of the genus, before the wings are formed.

PHASMA. PHASMA.

Generic Character.

Caput grande. *Antennæ* filiformes. *Oculi* parvi, rotundati.	*Head* large. *Antennæ* filiform. *Eyes* small, rounded.
Stemmata tria inter oculos.	*Stemmata* three, between the eyes.
Alæ quatuor, membranaceæ; superiores abbreviatæ, inferiores plicatæ.	*Wings* four, membranaceous; the upper pair abbreviated; the lower pleated.
Pedes ambulatorii.	*Feet* formed for walking.

THIS, which is not, strictly speaking, a Linnæan genus, being formed from some of the Linnæan Mantes, differs from the genus Mantis in having all the legs equally formed for walking, or without the falciform joint which distinguishes the fore-legs in the genus Mantis. The antennæ are setaceous, and the head large and broad: to these characters may be added the shortness of the upper wings or hemelytra, which scarcely cover more than about a third part of the body, while the lower wings are often very large and long. In their mode of life the Phasmata differ from the Mantes; feeding entirely on vegetable food. In the extraordinary



M. Griffiths sculp.

Ph. dilatatum

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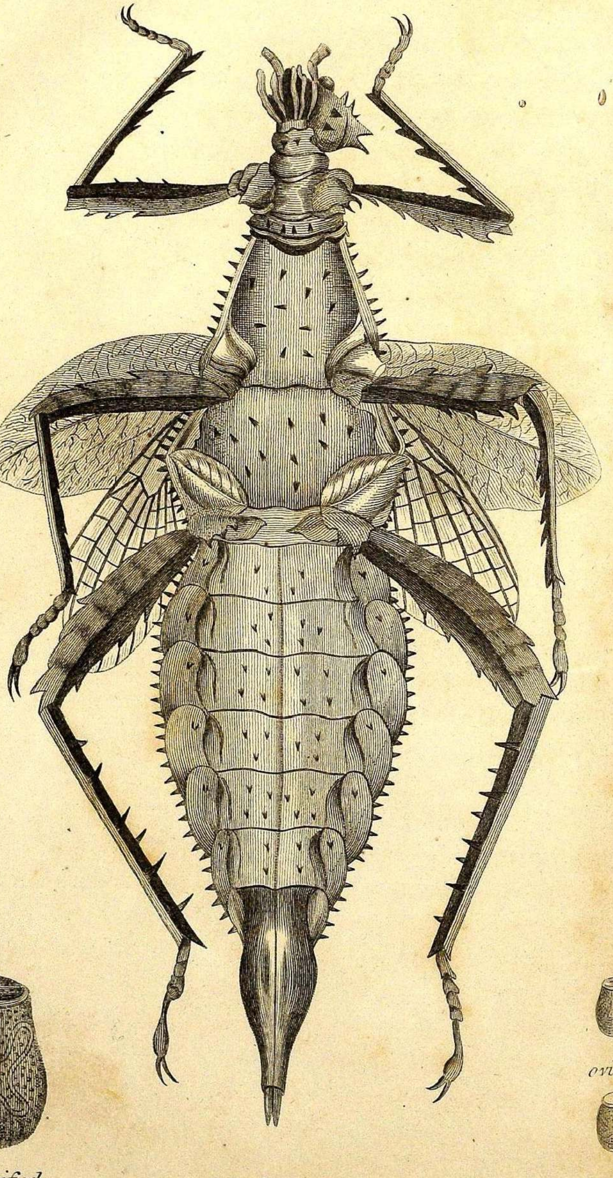
appearance of many of its species this genus is at least equal to the preceding.

The most remarkable is the *Phasma Gigas* or Giant Phasma. (*Mantis Gigas. Lin.*) This insect measures six or eight inches in length, and is of a very lengthened shape both in thorax and abdomen, which are of a subcylindric form, the thorax being roughened on the edges and upper surface by numerous small spines or tubercles: the upper wings are small, green, and veined like the leaves of a plant, while the lower are very ample, reaching half the length of the body or farther, of a very pale transparent brown, elegantly varied and tesselated by darker spots and patches: the legs are of moderate length, with the joints roughened by spines. The larva and pupa of this species bear a more singular appearance than even the complete insect, greatly resembling, on a general view, a piece of dry stick with several small broken twigs adhering to it: for this reason it has been generally known in collections by the name of the Walking Stick, and under this title is figured in Edwards's Gleanings of Natural History, and many other publications. It is however probable that though of a pale brown in its dry state, it is in reality green when living; the natural colour fading after death, as in many others of this tribe. It is a native of the island of Amboina. It may be added, that this insect either runs into several varieties as to size and some other particulars, or that there exist in reality many distinct species, which have been confounded under one

common name. The ingenious Mr. Donovan, in his elegant publication entitled "An Epitome of the Insects of China," mentions a specimen nearly thirteen inches in length. In the Leverian Museum exists a very capital specimen, which has been figured in the Naturalist's Miscellany; but the most exquisite representation yet given is in the incomparable work of Stoll.

The *Phasma dilatatum* is another extraordinary species, and seems to have been first described in the fourth volume of the Transactions of the Linnæan Society by Mr. John Parkinson. It is preserved in the Leverian Museum. The description given in the Linnæan Transactions runs as follows.

"This singular animal, which appears to be a species hitherto undescribed, is at present in the Leverian Museum. It is supposed to be a native of Asia, and belongs to that tribe of insects which Stoll has called Spectres, and which constitute a distinct genus from that of Mantis. The present species measures six inches and a quarter from the upper part or top of the head to the extremity of the abdomen. The whole animal is of a flattened form, more especially on the abdomen, which measures about an inch and half across in its broadest part: the thorax is of an obtusely rhomboidal form, the sides sloping each way from the flattish upper part. The whole thorax is not only edged with spines, but has also several very sharp ones distantly scattered over its surface. The head rises up backwards into an obtusely conic shape,



magnified

Ph. dilatatum

ovium

M. Griffiths. sculp.

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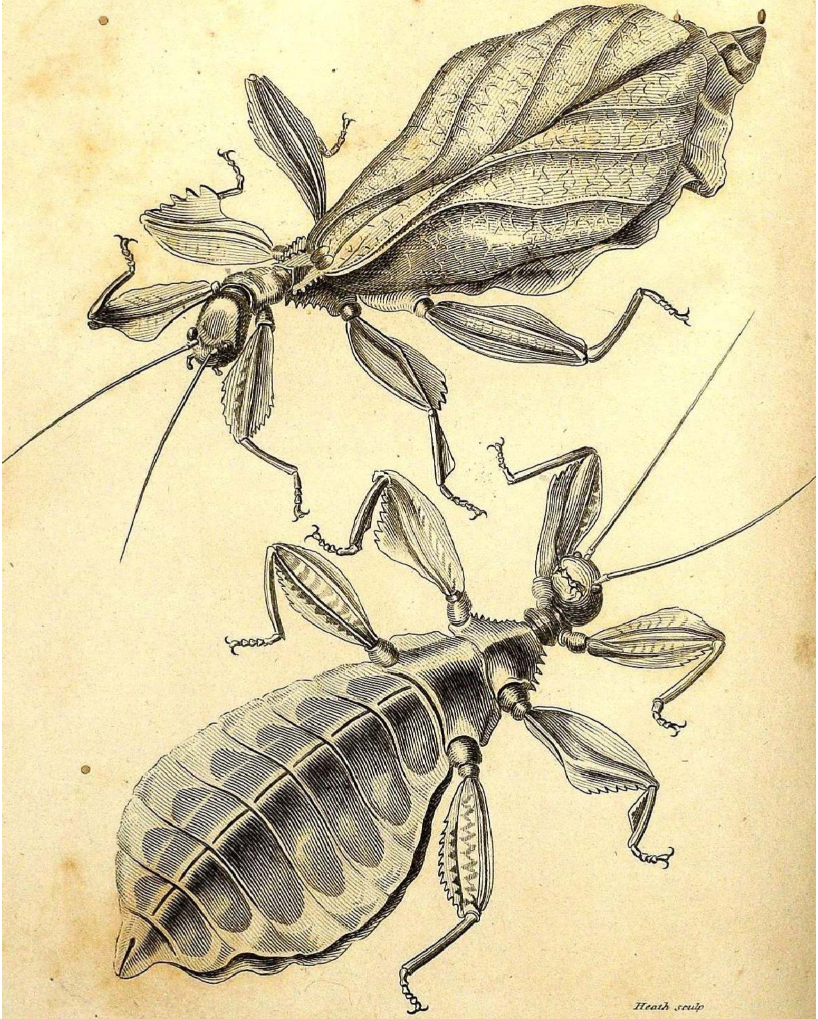
and has several very strong and large spines or processes. The abdomen is edged, almost throughout its whole length, with a continued series of small spines, to the number of five on the side of each individual segment: the extreme segments are without spines. The thighs or first joints of the lower pair of legs are in this insect remarkably strong, of a somewhat triangular shape, and beset with some strong spines; but the tibiæ or second joints are armed with far larger and stronger ones. The upper and middle pair of legs are of a nearly similar structure in proportion, but much less strongly spined. The colour of all the legs is green, tinged with brown; the spines blackish: the general colour of the thorax, abdomen, and head is now brown, but might probably have been green in the living animal. The wings are scarcely larger than the elytra or wing-sheaths, and seem originally to have been reddish, a tinge of that colour still pervading some parts of the wings: the tips are green: these wings are very strongly veined with brown fibres: the wing-cases are of a strong opake green, and were doubtless more vivid in the living insect: they have a great resemblance to a pair of leaves. The mouth has four palpi, which are rather long, and under the mouth are situated two leaf-shaped organs, perhaps belonging to the action of that part. The antennæ are wanting, the first joints alone remaining. The abdomen is terminated by a kind of boat-shaped organ, the keel of which possesses a considerable space beneath the abdo-

men, so that fewer segments appear on that part than above. The concavity of this organ is covered by a terminal scale and bifid process, constituting the tip of the abdomen on the upper part. On raising this valve, an ovum, nearly of the size of a pea, but of a more lengthened form, was discovered lying in the cavity beneath; and on inspecting farther into the cavity of the abdomen, a great many more ova, exactly similar, were found, to the number of five or six-and-twenty, some still remaining in the upper part: these eggs are of a slightly oblong shape, but flattened at one end: they are of a brown colour, and marked all over with numerous impressed points; and have on one side a mark or double waved line, so disposed as to represent a kind of cross, as if carved on the surface: the flattened end is surrounded by a small rim or ledge, and seems to be the part which opens at the exclusion of the larva, since it readily separates from the rest. On immersing some of these ova in warm water, and opening them, the included yolk, of a deep yellow colour, and of the appearance of a transparent gum, was discovered; and this, when burned, afforded the usual smell of animal substances, but in some it was accompanied by a slight degree of fragrance. It is perhaps needless to observe that these mature ova clearly prove the insect to be in its complete or ultimate state, and not in that of a larva."

Some insects of this genus, like the preceding, are remarkable for the extreme, and even deceptive resemblance which their upper wings bear to



Ph. siccifolium.

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the leaves of trees. This is evidently a provision of Nature for the security of the animal against the attacks of birds, &c. as well as for the more ready attainment of its prey; since when sitting among the branches of trees, &c. it eludes the notice both of the former and the latter. Of this kind is the *Phasma siccifolium,* (Mantis siccifolia. Lin.) the wings of which, when closed, so strongly resemble the appearance of a leaf, that the insect is frequently known in cabinets under the name of the walking leaf, as the larva of the Phasma Gigas is by that of the walking stick. The female of this species has no under wings.

GRYLLUS. LOCUST.

Generic Character.

Caput inflexum, maxillosum, palpis instructum.

Antennæ plerisque setaceæ seu filiformes.

Alæ quatuor, deflexæ, convolutæ; inferiores plicatæ.

Pedes postici saltatorii: ungues ubique bini.

Head inflected, armed with jaws, and furnished with feelers.

Antennæ, in most species, either filiform or setaceous.

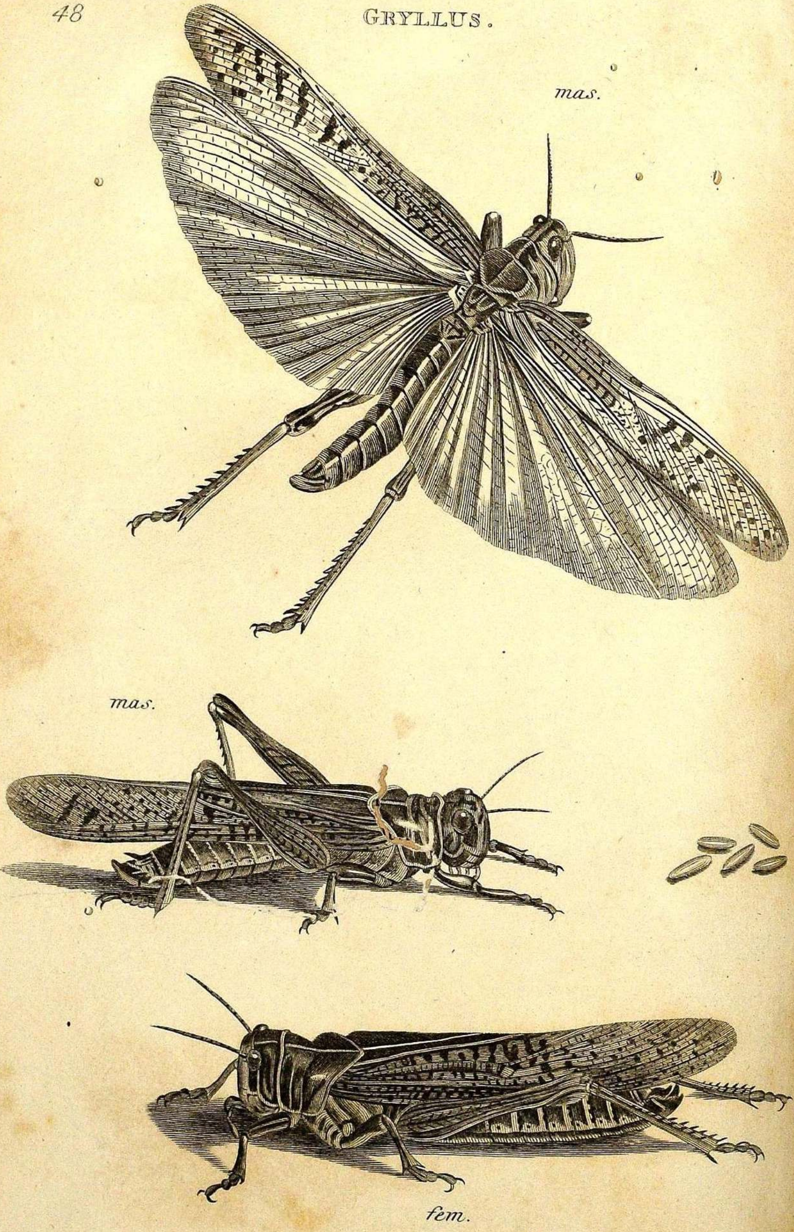
Wings four, deflex, convoluted: lower wings pleated.

Hind-Legs formed for leaping: claws double on all the feet.

IN the genus Gryllus the antennæ are in most species setaceous, in others filiform, and in some flat and lanceolate: the head is large, bent downwards, and furnished with strong jaws: the wings are four in number; the upper or exterior ones deflected, and longitudinally extended; and the lower or under ones pleated: the hind legs are formed for leaping, greatly exceed the rest in length, and are furnished with very strong, broad thighs.

The major part at least, if not all of this genus feed entirely on vegetables, and from their num-

GRYLLUS.



G. migratorius.

M. Griffiths sculp.

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bers and voracity constitute one of the severest pests of the hotter regions of the globe, occasionally committing the most dreadful ravages, and converting the most fertile provinces into the appearance of barren deserts.

Among the most noxious species is the *Gryllus migratorius* of Linnæus, or common migratory locust, which of all the insects capable of injuring mankind seems to possess the most dreadful powers of destruction. Legions of these animals are from time to time observed in various parts of the world, where the havoc they commit is almost incredible: whole provinces are in a manner desolated by them in the space of a few days, and the air is darkened by their numbers: nay even when dead they are still terrible; since the putrefaction arising from their inconceivable number is such that it has been regarded as one of the probable causes of pestilence in the Eastern regions. This formidable Locust is generally of a brownish colour, varied with pale red or flesh-colour, and the legs are frequently blueish. In the year 1748 it appeared in irregular flights in several parts of Europe, as in Germany, France and England; and in this capital itself and its neighbourhood great numbers were seen: they perished however in a short time, and were happily not productive of any material mischief, having been probably driven by some irregular wind out of their intended course, and weakened by the coolness of the climate.

From a paper published in the 18th volume of

the Philosophical Transactions we find that in the year 1693 some swarms of this species of Locust settled in some parts of Wales. Two vast flights were observed in the air not far from the town of *Dol-galken* in Merionethshire: the others fell in Pembrokeshire. From a letter published in the 38th volume of the same work it appears that some parts of Germany, particularly in the March of Brandenburgh, &c. suffered considerable injury from the depredations of these animals. They made their appearance in the spring of the year 1732, from flights which had deposited their eggs in the ground the preceding year. They attacked and devoured the young spike of the wheat, &c. and this chiefly by night, and thus laid waste many acres at a time beyond all hope of recovery. In the 46th volume of the same Transactions we find a description of the ravages of these animals in Walachia, Moldavia, Transylvania, Hungary, and Poland in the years 1747 and 1748.

"The first swarms entered into Transylvania in August 1747: these were succeeded by others, which were so surprisingly numerous, that when they reached the *Red Tower*, they were full four hours in their passage over that place; and they flew so close that they made a sort of noise in the air by the beating of their wings against one another. The width of the swarm was some hundreds of fathoms, and its height or density may be easily imagined to be more considerable, inasmuch as they hid the sun, and darkened the sky, even to that degree, when they flew low, that people could

G. cristatus

Heath sculp.

1805, Octr. 1. London Published by G. Kearsley, Fleet Street.

not know one another at the distance of twenty paces: but, whereas they were to fly over a river that runs in the vallies of the *Red Tower*, and could find neither resting-place nor food; being at length tired with their flight, one part of them lighted on the unripe corn on this side of the *Red Tower*, such as millet, Turkish wheat, &c.; another pitched on a low wood, where, having miserably wasted the produce of the land, they continued their journey, as if a signal had actually been given for a march. The guards of the *Red Tower* attempted to stop their irruption into Transylvania by firing at them*; and, indeed, where the balls and shot swept through the swarm, they gave way and divided; but, having filled up their ranks in a moment, they proceeded on their journey. In the month of September some troops of them were thrown to the ground by great rains and other inclemency of the weather, and thoroughly soaked with wet, they crept along in quest of holes in the earth, dung, and straw; where, being sheltered from the rains, they laid a vast number of eggs, which stuck together by a viscid juice, and were longer and smaller than what is commonly called an ant's egg†, very like grains of oats. The females, having laid their eggs, die, like the Silk-

* In the Eastern parts of the world it is often found necessary for the Governors of particular provinces to command a certain number of the military to take the field against armies of Locusts with a train of artillery.

† Which is not the real egg, but the chrysalis of the ant, enveloped in its oval silken case.

worm; and we Transylvanians found by experience that the swarm which entered our fields by the *Red Tower*, did not seem to intend remaining there, but were thrown to the ground by the force of the wind, and there laid their eggs; a vast number of which being turned up and crushed by the plough in the beginning of the ensuing spring, yielded a yellowish juice. In the spring of 1748 certain little blackish worms were seen lying in the fields and among the bushes, sticking together, and collected in clusters, not unlike the hillocks of moles or ants. As nobody knew what they were, so there was little or no notice taken of them, and in May they were covered by the shooting of the corn sown in winter; but the subsequent June discovered what those worms were; for then, as the corn sown in spring was pretty high, these creatures began to spread over the fields, and become destructive to the vegetables by their numbers. Then at length the country people, who had slighted the warning given them, began to repent of their negligence; for as these insects were now dispersed all over the fields, they could not be extirpated without injuring the corn. At that time they differed little or nothing from our common Grasshoppers, having their head, sides, and back of a dark colour, with a yellow belly, and the rest of a reddish hue. About the middle of June, according as they were hatched sooner or later, they were generally a finger's length, or somewhat longer, but their shape and colour still continued. Towards the end of June they cast off their outward covering, and then it plainly ap-

peared that they had wings, very like the wings of bees, but as yet unripe and unexpanded; and then their body was very tender, and of a yellowish green: then, in order to render themselves fit for flying, they gradually unfolded their wings with their hinder feet, as flies do, and as soon as any of them found themselves able to use their wings, they soared up, and by flying round the others, enticed them to join them; and thus, their numbers encreasing daily, they took circular flights of twenty or thirty yards square, until they were joined by the rest; and after miserably laying waste their native fields, they proceeded elsewhere in large troops. Wheresoever those troops happened to pitch, they spared no sort of vegetable: they eat up the young corn, and the very grass; but nothing was more dismal than to behold the lands in which they were hatched; for they so greedily devoured every green thing thereon, before they could fly, that they left the ground quite bare."

"There is nothing to be feared in those places to which this plague did not reach before the autumn; for the Locusts have not strength to fly to any considerable distance but in the months of July, August, and the begining of September; and even then, in changing their places of residence, they seem to tend to warmer climates."

"Different methods are to be employed, according to the age and state of these insects; for some will be effectual as soon as they are hatched; others when they begin to crawl, and others in

fine when they begin to fly; and experience has taught us here in Transylvania, that it would have been of great service to have diligently sought out the places where the females lodged; for nothing was more easy than carefully to visit those places in March and April, and to destroy their eggs or little worms with sticks or briars; or if they were not to be beat out of the bushes, dunghills, or heaps of straw, to set fire to them; and this method would have been very easy, convenient, and successful, as it has been in other places; but in the summer, when they have marched out of their spring-quarters, and have invaded the cornfields, &c. it is almost impossible to extirpate them without thoroughly threshing the whole piece of land that harbours them with sticks or flails; and thus crushing the locust with the produce of the land. Finally, when the corn is ripe or nearly so, we have found, to our great loss, that there is no other method of getting rid of them, or even of diminishing their numbers, but to surround the piece of ground with a multitude of people, who might fright them away with bells, brass vessels, and all other sorts of noise. But even this method will not succeed till the sun is pretty high, so as to dry the corn from the dew; for otherwise they will either stick to the stalks, or lie hid under the grass; but when they happen to be driven to a waste piece of ground, they are to be beat with sticks or briars; and if they gather together in heaps, straw or litter may be thrown over them and set on fire. Now this method seems rather

to lessen their numbers than totally destroy them; for many of them lurk under the grass or thick corn, and in the fissures of the ground from the sun's heat: wherefore it is requisite to repeat this operation several times, in order to diminish their numbers, and consequently the damage done by them. It will likewise be of use, where a large troop of them has pitched, to dig a long trench, of an ell width and depth, and place several persons along its edges, provided with brooms and such-like things, while another numerous set of people form a semicircle that takes in both ends of the trench, and encompasses the locusts, and, by making the noise above-mentioned, drive them into the trench, out of which if they attempt to escape, those on the edges are to sweep them back, and then crush them with their brooms and stakes, and bury them by throwing in the earth again. But when they have begun to fly, there should be horsemen upon the watch in the fields, who, upon any appearance of the swarm taking wing, should immediately alarm the neighbourhood by a certain signal, that they might come and fright them from their lands by all sorts of noise; and if tired with flying, they happen to pitch on a waste piece of land, it will be very easy to kill them with sticks and brooms in the evening or early in the morning, while they are wet with the dew; or any time of the day in rainy weather, for then they are not able to fly. I have already taken notice that, if the weather be cold or wet in autumn, they generally hide themselves in secret places, where they

lay their eggs, and then die: therefore great care should be taken at this time, when the ground is freed of its crop, to destroy them before they lay their eggs. In this month of September, 1748, we received certain intelligence that several swarms of Locusts came out of Walachia into Transylvania through the usual inlets, and took possession of a tract of land in the neighbourhood of *Clausberry*, near three miles in length, where it was not possible to save the millet and Turkish wheat from these devourers. I am of opinion that no instance of this kind will occur in our history, except what some old men remember, and what we have experienced; at least there is no account that any Locusts came hither which did not die before they laid their eggs: however this is a known fact; that about forty years ago, some swarms came hither out of Walachia, and did vast damage wherever they settled, but either left this country before the end of summer, or died by the inclemency of the weather."

As an appendix to the foregoing account it is added by a correspondent from Vienna, that "a considerable number of locusts had also come within twenty leagues of that city, and that one column of them had been seen there, which was about half an hour's journey in breadth; but of such a length that, after three hours, though they seemed to fly fast, one could not see the end of the column."

We have before observed, that the Locusts which fell in several parts of England, and in particular in the neighbourhood of the metropolis, in

the year 1748, were evidently some straggling detatchments from the vast flights which in that year visited many of the inland parts of the European Continent.

The ravages of Locusts in various parts of the world, at different periods, are recorded by numerous authors, and a summary account of their principal devastations may be found in the works of Aldrovandus. Of these a few shall be selected as examples. Thus, in the year 593 of the Christian era, after a great drought, these animals appeared in such vast legions as to cause a famine in many countries. In 677 Syria and Mesopotamia were overrun by them. In 852 immense swarms took their flight from the Eastern regions into the West, flying with such a sound that they might have been mistaken for birds: they destroyed all vegetables, not sparing even the bark of trees and the thatch of houses; and devouring the corn so rapidly as to destroy, on computation, an hundred and forty acres in a day; their daily marches or distances of flight were computed at twenty miles; and these were regulated by leaders or kings, who flew first, and settled on the spot which was to be visited at the same hour the next day by the whole legion: these marches were always undertaken at sunrise. These Locusts were at length driven by the force of winds into the Belgic ocean, and being thrown back by the tide and left on the shores, caused a dreadful pestilence by their smell. In 1271 all the corn-fields of Milan were destroyed; and in the year 1339 all those of Lombardy.

In 1541 incredible hosts afflicted Poland, Walachia, and all the adjoining territories, darkening the sun with their numbers and ravaging all the fruits of the earth.

One of the largest species of Locust yet known is the *Gryllus cristatus* of Linnæus, which is five or six times the size of the Gryllus migratorius, and, together with some others of the larger kind, is made use of in some parts of the world as an article of food: they are eaten both fresh and salted, in which last state they are publickly sold in the markets of some parts of the Levant. The quantity of edible substance which they afford is but small, especially in the male insects; but the females, on account of the ovaries, afford a more nutritious sustenance. It is well known that different interpretations have been sometimes given of the passage in the sacred writings in which John the Baptist is said to have fed on Locusts and wild honey; and the word ακριδας has been supposed to mean the young shoots of vegetables rather than Locusts; but, since the fact is established, that these insects are still eaten by the inhabitants of the East, there seems not the least reason for admitting any other interpretation than the usually received one. Why should we wonder that the abstemious prophet, during his state of solitary seclusion from the commerce of the world, should support himself by a repast which is to be numbered, not among the luxuries of life, but merely regarded as a substitute for food of a more agreeable nature? We may also adduce in support of

this idea, the testimony of Hasselquist, who thus expresses himself on this very subject. "They who deny insects to have been the food of this holy man, urge, that this insect is an unaccustomary and unnatural food; but they would soon be convinced of the contrary, if they would travel hither, to Egypt, Arabia, or Syria, and take a meal with the Arabs. Roasted locusts are at this time eaten by the Arabs, at the proper season, when they can procure them; so that in all probability this dish has been used in the time of St. John. Ancient customs are not here subject to many changes, and the victuals of St. John are not believed unnatural here; and I was assured by a judicious Greek priest, that their Church had never taken the word in any other sense; and he even laughed at the idea of its being a bird or a plant."

Hasselquist's Travels. Engl. Transl. p. 419.

The Gryllus cristatus above-mentioned is a highly beautiful animal; being of a bright red, with the body annulated with black; and the legs varied with yellow: the upper wings tesselated with alternate variegations of dark and pale green; the lower with transverse, undulated streaks: the length of the animal from head to tail is about four inches, and the expanse of wings from tip to tip, when fully extended, hardly less than seven inches and a half. It is exquisitely figured in the works of Röesel.

Greatly allied to the preceding is the *Gryllus Dux*, figured in the elegant work of Mr. Drury.

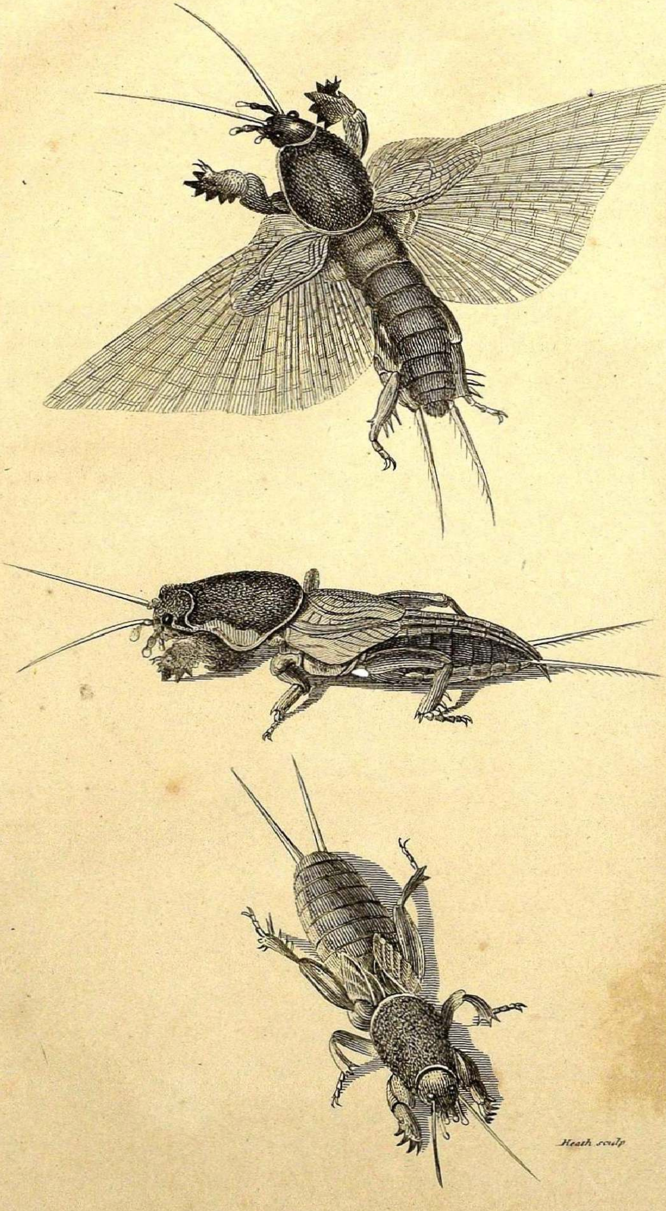
It is of the same size and general appearance, but has the body green; the upper wings brown, with the front-edge green; and the lower wings red, with numerous black spots disposed in such a manner as to form transverse streaks. It is a native of South-America and the West-Indian islands.

The *Gryllus viridissimus* of Linnæus is one of the largest European species, and is often seen during the decline of summer in our own country. It is wholly of a pale grass-green, with a slight blueish cast on the head and under part of the thorax, which is marked above by a longitudinal reddish-brown line: the length of the insect, from the mouth to the tips of the wings is about two inches and a half: the female is distinguished by a long sword-shaped process at the end of the body, being the instrument with which she pierces the ground in order to deposit her eggs: it consists of a pair of valves, through the whole length of which the eggs are protruded: they are of an oblong form, and of a pale brown colour.

The *Gryllus verrucivorus* is also found in some parts of England, and is of an equal size with the viridissimus, but of a reddish-brown colour, with darker variegations: this animal, according to Linnæus, is frequently applied by the people in Sweden to warts on the hands, which it is suffered to bite off, and is said thus to prevent their return.

But of all the British insects of this genus the *Gryllus Gryllotalpa* or Mole-Cricket is by far the most curious; and in its colour and manners dif-

GRYLLUS



Heath sculp

G. Gryllotalpa.

1805, Octr. 1 London Published by G. Kearsley Fleet Street.

fers greatly from the rest. It is of an uncouth, and even formidable aspect, measuring more than two inches in length; and is of a broad and slightly flattened shape, of a dusky brown colour, with a ferruginous cast on the under parts, and is readily distinguished by the extraordinary structure of its fore-legs, which are excessively strong, and furnished with very broad feet divided into several sharp, claw-shaped segments, with which it is enabled to burrow under ground in the manner of a Mole: the lower wings, which, when expanded, are very large, are, in their usual state, so complicated under the very short and small upper-wings or sheaths, that their ends alone appear, reaching, in a sharpened form, along the middle of the back; the abdomen is terminated by a pair of sharp-pointed, lengthened, hairy processes, nearly equalling the length of the antennæ in front, and contributing to give this animal an appearance in some degree similar to that of a Blatta.

The Mole-Cricket emerges from its subterraneous retreats only by night, when it creeps about the surface, and occasionally employs its wings in flight. It prepares for its eggs an oval nest, measuring about two inches in its longest diameter: this nest is situated a hand's breadth below the surface of the ground: it is accurately smoothed within, and is furnished with an obliquely curved passage leading to the surface. The eggs are about two hundred and fifty or three hundred in number, nearly round, of a deep brownish yellow

colour, and of the size of common shot: on the approach of winter, or any great change of weather, these insects are said to remove the nest, by sinking it deeper*, so as to secure it from the power of frost, and when the spring commences, again raising it in proportion to the warmth of the season, till at length it is brought so near the surface as to receive the full influence of the air and sunshine: but should unfavourable weather again take place, they again sink the precious deposit, and thus preserve it from danger. The eggs are usually deposited in the month of June or July, and the young are hatched in August. At their first exclusion they are about the size of ants, for which, on a cursory view, they might be mistaken; but on a close inspection are easily known by their broad feet, &c. In about the space of a month they are grown to the length of more than a quarter of an inch; in two months upwards of three quarters; and in three months to the length of more than an inch. Of this length they are usually seen during the close of autumn, after which they retire deep beneath the surface; not appearing again till the ensuing spring. During their growth they cast their skin three or four times.

The Mole-Cricket lives entirely on vegetables,

* This is affirmed by Goedart, but is disbelieved by Reaumur and Roësel; and it appears from experiment that the nest always requires to be kept in a moist situation; the eggs, if exposed to a dry air, being entirely shrivelled and destroyed.

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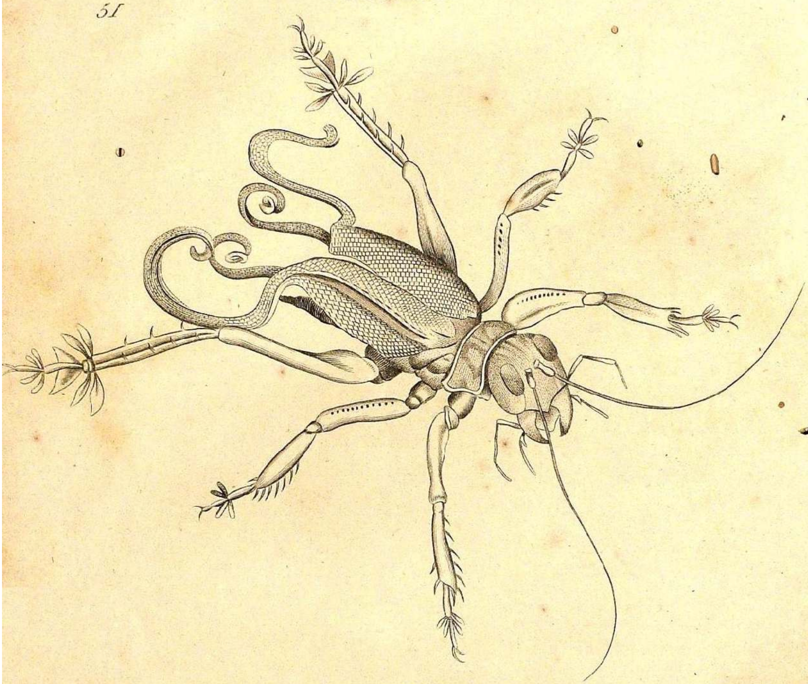
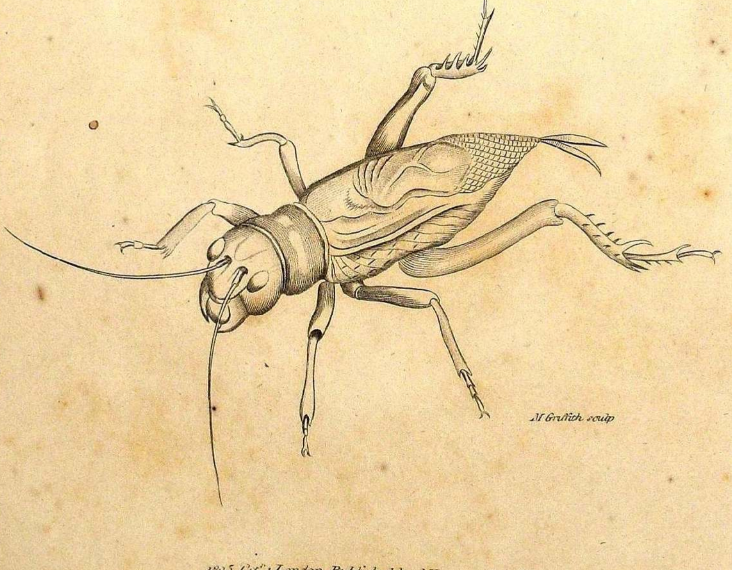


G. Monstrosus.



M Griffith sculp

1805, Octr 1 London, Published by G Kearsley Fleet Street.

devouring the young roots of grasses, corn, and various esculent plants, and commits great devastation in gardens. It is found in most parts of Europe, and in the northern parts of Asia and America.

In South-America is found a species of a still more uncouth appearance than the Gryllotalpa, being of a larger size, with the wings running out into a pair of long, narrow convolutions, reaching far beyond the body; while all the legs are longer than is usual in this genus, and have the feet furnished on each side with several oval, foliaceous processes: the whole animal is of a brown colour, with a large head, and very strong jaws.

It would be unnecessary to add, that the small insects commonly termed Grasshoppers belong to this genus.

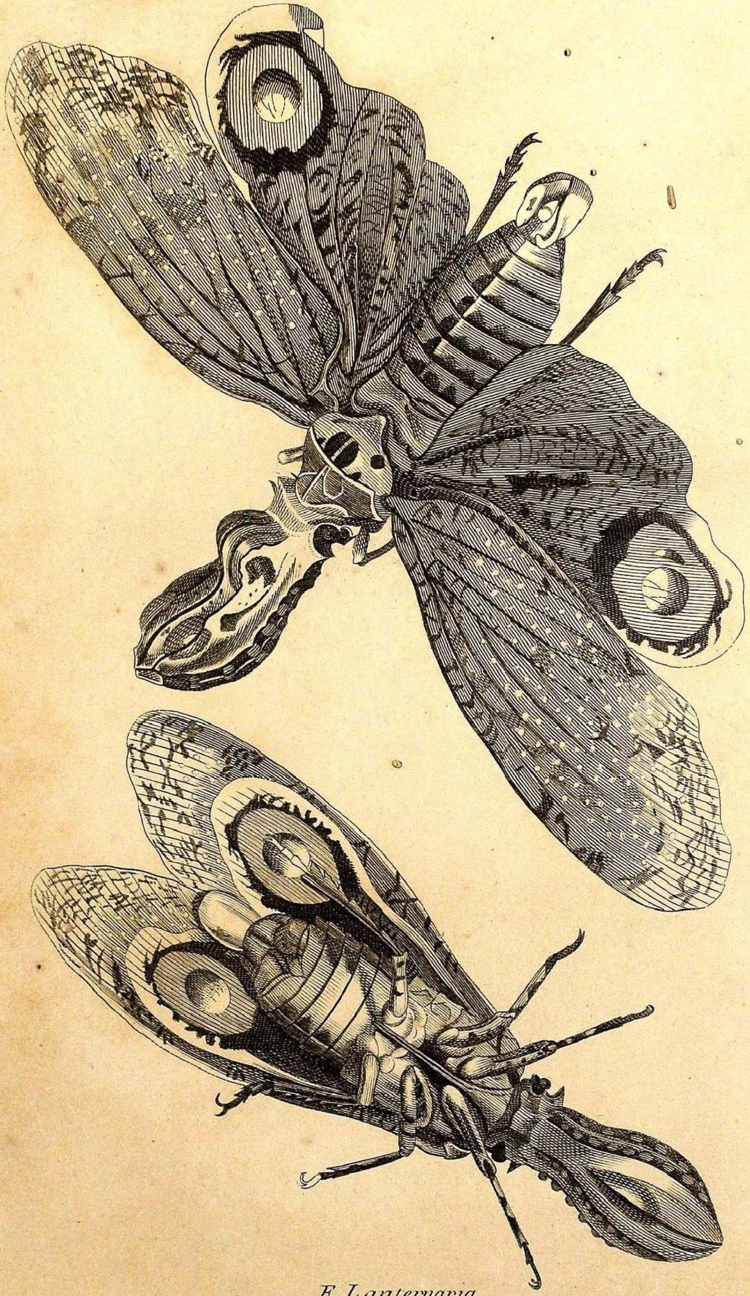
FULGORA. LANTERN-FLY.

Generic Character.

Caput fronte producta, inani.	*Head* produced into an inflated hollow front.
Antennæ infra oculos, articulis duobus; exteriore globoso majore.	*Antennæ* beneath the eyes, of two joints, the exterior larger and globose.
Rostrum inflexum.	*Snout* inflected.
Pedes gressorii.	*Feet* formed for walking.

THIS highly singular genus is distinguished by having the Antennæ formed by two very short joints, the exterior of which is globular, and tipped by a short hair: they are seated immediately beneath the eyes: the snout is strait, and inflected beneath the breast, and the feet are formed for walking.

The *Fulgora Lanternaria* or Peruvian Lantern-Fly is undoubtedly one of the most curious of insects: it is of a very considerable size, measuring nearly three inches and a half from the tip of the front to that of the tail, and about five inches and a half from wing's end to wing's end when expanded: the body is of a lengthened oval shape, roundish or subcylindric, and divided into several rings or segments: the head is nearly equal to the length of the rest of the animal, and is oval, inflated,



F. Lanternaria

Heath sculp.

1805, Octr. 1 London, Published by G. Kearsley, Fleet Street.

and bent slightly upwards: the ground-colour is an elegant yellow, with a strong tinge of green in some parts, and marked with numerous bright red-brown variegations in the form of stripes and spots: the wings are very large, of a yellow colour, most elegantly varied with brown undulations and spots, and the lower pair are decorated by a very large eye-shaped spot on the middle of each, the iris or border of the spot being red, and the centre half red and half semitransparent white: the head or lantern is pale yellow, with longitudinal red stripes. This beautiful insect is a native of Surinam and many other parts of South-America, and during the night diffuses so strong a phosphoric splendor from its head or lantern that it may be employed for the purpose of a candle or torch; and it is said that three or four of the insects, tied to the top of a stick, are frequently used by travellers for that purpose. The celebrated Madam Merian, in her work on the Insects of Surinam, gives a very agreeable account of the surprize into which she was thrown by the first view of the flashes of light proceeding from these Insects. "The Indians once brought me," says she, "before I knew that they shone by night, a number of these Lantern-Flies, which I shut up in a large wooden box. In the night they made such a noise that I awoke in a fright, and ordered a light to be brought; not knowing from whence the noise proceeded. As soon as we found that it came from the box, we opened it; but were still much more alarmed, and let it fall to the ground

in a fright, at seeing a flame of fire come out of it; and as many animals as came out, so many flames of fire appeared. When we found this to be the case, we recovered from our fright, and again collected the insects, highly admiring their splendid appearance."

Dr. Darwin, in a note to some lines relative to luminous insects, in his beautiful poem the Loves of the Plants, makes Madam Merian affirm that she drew and finished her figure of the insect by its own light. On examination however, I cannot find the least authority for this declaration on the part of Madam Merian, who relates only what is above stated, with the observation that the light of one of the insects is sufficient to read a common news-paper by. It may be proper to add, that this celebrated lady falls into a mistake in supposing that a species of Cicada, which she represents on the same plate with the Lantern-Fly, was its larva; and that it gradually was transformed into the Fulgora. This information indeed she merely gives as the popular report, but at the same time takes the liberty of representing the insect in its supposed half-complete state, with the head of the Fulgora, and the wings and body of the Cicada.

I cannot conclude the description of this species without giving due praise to the exquisite representation of Roësel, who has engraved it both with its wings closed and expanded. Degeer observes that the beautiful colours with which Roësel's figures are adorned were not perceptible either in the specimens examined by himself, or in those

described by Reaumur. In the Leverian Museum however are a fine pair of these insects, which, though now somewhat faded, at their first introduction fully justified the colouring of Roësel and Merian, and left no doubt of the richly variegated appearance of the animal in its living state.

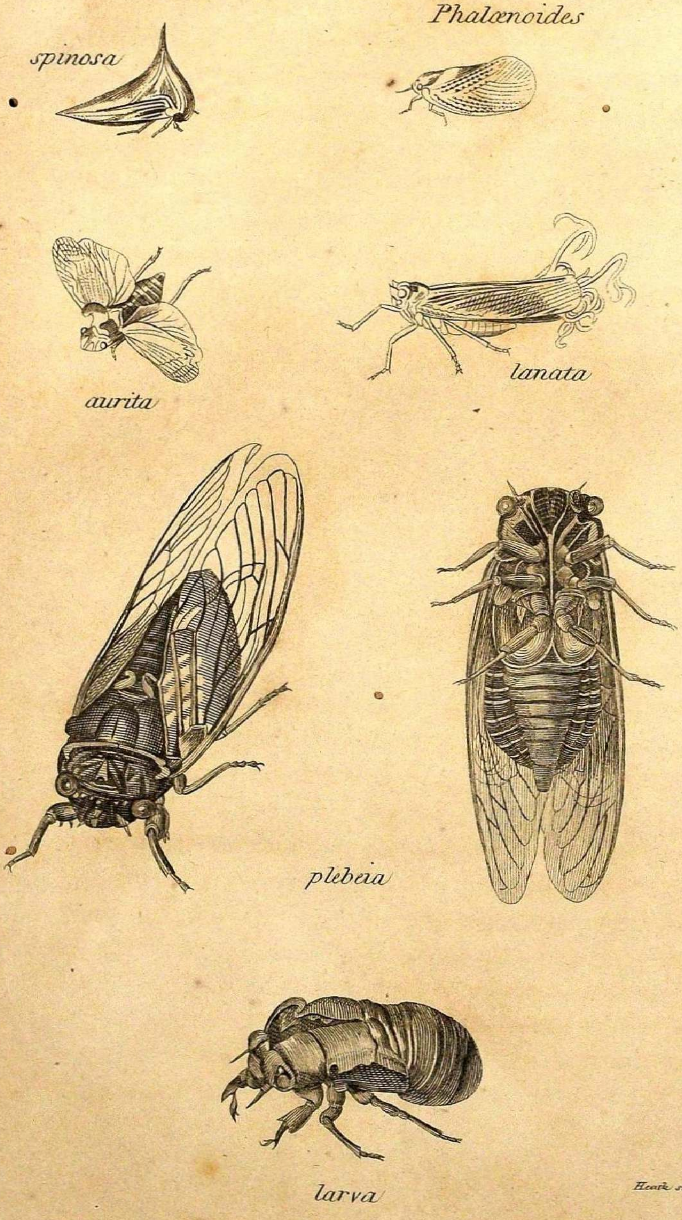
The *Fulgora Candelaria* is a much smaller species than the preceding, and is a native of China. It measures near two inches in length, and 2 inches and half in breadth with the wings expanded: the body is oval, and the head produced into a long horn-shaped process: the colours are very elegant; the head and horn being of a fine reddish brown or purple, and covered with numerous white specks of a mealy appearance: the thorax is of a deep or orange-yellow, and the body black above, but deep yellow beneath: the wings are oval; the upper pair blackish, with very numerous and close-set green reticulations, dividing the whole surface into innumerable squares or marks, and are farther decorated by several yellow bars and spots: the under wings are orange-coloured, with broad black tips.

Fulgora Diadema is an Indian species, and is distinguished by having a long, spiny, or muricated front, with a triple division at the tip: its colour is brown, with red and yellow variegations: it seems to have been first described and figured in the work of Seba: in size it is nearly similar to the preceding species.

In the twelfth edition of the Systema Naturæ the number of species in the genus Fulgora

amounted only to nine: it has since been increased to the number of twenty-five. Of these most are exotic, but two are natives of our own island: they are very small, and undistinguished by any shining quality.

CICADA.



Heath sculp.

1806 Oct.1 London Published by G. Kearsley. Fleet Street.

CICADA. CICADA.

Generic Character.

Rostrum inflexum.	*Snout* inflected.
Antennæ brevissimæ, setaceæ.	*Antennæ* very short, setaceous.
Alæ quatuor, membranaceæ, deflexæ.	*Wings* four, membranaceous, deflected.
Pedes plerisque saltatorii.	*Feet* in most species formed for leaping.

Of this genus the most common European species is the *Cicada plebeja* of Linnæus. This is the insect so often commemorated by the ancient poets, and so generally confounded by the major part of translators with the Grasshopper. It is a native of the warmer parts of Europe, and particularly of Italy and Greece; appearing in the hotter months of summer, and continuing its shrill chirping during the greatest part of the day; generally sitting among the leaves of trees. These insects proceed from eggs deposited by the parent in and about the roots of trees, near the ground. They hatch into larvæ, which, when grown to their full size, are the Tettigometræ of the ancient writers; and after having continued

in this state of larva near two years, cast their skins, and produce the complete insect.

The ancients differ in their opinions relative to the Cicadæ. Virgil speaks of them as insects of a disagreeable and stridulous tone*. On the contrary, Anacreon compliments them on their musical note, and makes the Cicada a favourite of Apollo.

"Happy Insect! blithe and gay,
Seated on the sunny spray,
And drunk with dew, the leaves among,
Singing sweet thy chirping song!

All the various season's treasures,
  All the products of the plains
Thus lie open to thy pleasures,
  Fav'rite of the rural swains.

On thee the Muses fix their choice,
  And Phœbus adds his own,
Who first inspir'd thy lively voice
  And tun'd the pleasing tone.

Thy cheerful note in wood and vale
  Fills every heart with glee;
And summer smiles in double charms
  While thus proclaim'd by thee.

Like Gods canst thou the nectar sip,
  A lively chirping elf;
From labour free, and free from care,
  A little God thyself!"

There is also a very pleasing and elegant tale †,

* Bucol. 2. &c.

† See *Antiq: mirab: narrat: lib.* 1. *Strab. geogr. lib.* 6.

related by ancient authors, of two rival* musicians alternately playing for a prize; when one of the candidates was so unfortunate as to break a string of his lyre; by which accident he would certainly have failed; when a Cicada, flying near, happened to settle on his Lyre, and by its own note supplied the defective string, and thus enabled the favoured candidate to overcome his antagonist. So remarkable was the event, that a statue was erected to perpetuate the memory of it, in which a man is represented playing on a lyre, on which sits a Cicada.

Notwithstanding these romantic attestations in favor of the Cicada, it is certain that modern ears are offended rather than pleased with its voice, which is so very strong and stridulous that it fatigues by its incessant repetition; and a single Cicada hung up in a cage has been found almost to drown the voice of a whole company.

It is to be observed that the male Cicada alone exerts this powerful note; the females being entirely mute: hence the old witticism attributed to that incorrigible sensualist Xenarchus the Rhodian.

"Happy the Cicadas' lives,
Since they all have voiceless wives!"

That a sound so piercing should proceed from so small a body may well excite our astonishment; and the curious apparatus by which it is produced

* Viz. Eunomus of Locris, and Aristo of Rhegium.

has justly claimed the attention of the most celebrated investigators. Reaumur and Roësel in particular have endeavoured to ascertain the nature of the mechanism by which the noise is produced, and have found that it proceeds from a pair of concave membranes, seated on each side the first joints of the abdomen: the large concavities of the abdomen, immediately under the two broad lamellæ in the male insect, are also faced by a thin, pellucid, iridescent membrane, serving to increase and reverberate the sound, and a strong muscular apparatus is exerted for the purpose of moving the necessary organs.

The Cicada plebeja is thus distinguished by Linnæus as a species*, viz. Cicada with the tip of the scutellum bidentated, and the upper wings marked with four anastomoses and six ferruginous lines.

In this division of the genus Cicada are several large and elegant insects, as the *Cicada hæmatodes*, distinguished by its body of a polished black colour, with the divisions of the abdomen marked by so many scarlet rings or bands, and the *Cicada atrata*, which is of a fine black, varied beneath with yellow streaks in the direction of the abdominal and thoracic divisions: the wings are black to some distance from the base. In this tribe also ranks the *Cicada viridis*, a large species, na-

* It is to be observed however that from a great general similarity between the Cicadæ of this division or tribe, it is difficult to form specific characters sufficiently distinctive; and it may be doubted whether the present be so.

tive of New Holland, of a beautiful green colour, with the transparent wings ornamented by green veins.

Among the smaller European Cicadæ one of the most remarkable is the *Cicada spumaria* or Cuckow-spit Cicada, so named from the circumstance of its larva being constantly found enveloped in a mass of white froth adhering to the leaves and stems of vegetables. This froth, which is popularly known by the name of Cuckow-Spittle, is found during the advanced state of summer, and is the production of the included larva, which, from the time of its hatching from the egg deposited by the parent insect, continues, at intervals, to suck the juices of the stem on which it resides, and to discharge them from its vent in the form of very minute bubbles, and by continuing this operation, completely covers itself with a large mass of froth; which is sometimes so overcharged with moisture, that a drop may be seen hanging from its under surface. The included larva, or pupa, (for no material difference can be observed between these two states,) when arrived at its full growth, is about the fifth of an inch in length, of an oval shape, with broad head and thorax, and slightly pointed abdomen: its colour is a beautiful pale green, and the trunk or sucker with which it extracts the sap of the plant, may be observed by examining the under part of the thorax, where it will be seen pressed down in a strait direction from the head. When the time arrives in which the animal is to undergo its change into the complete insect, it

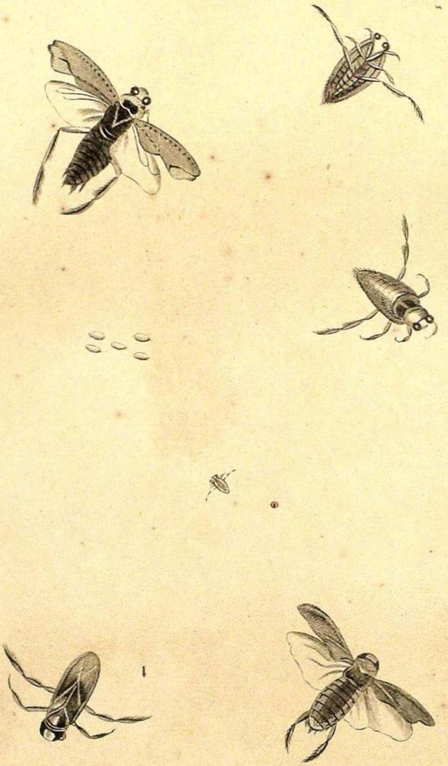
ceases to absorb any longer the juices of the plant and to discharge the protecting froth, which, at this period, forms a vaulted canopy over the insect, instead of entirely investing it as before: the skin of the larva is gradually thrown off, and the animal in its complete form emerges from its concealment. Its size is scarcely superior to that of the larva, but its colour is brown, with a pair of broad, irregular, pale or whitish bands across the upper wings. If disturbed, it nimbly springs to a great distance, and is commonly known by the name of the Froghopper, from some fancied resemblance to the colour and shape of that animal in miniature. These insects breed during the month of September, and towards the beginning of October deposit their eggs, which are not hatched till the succeeding spring.

Of similar size and shape to the preceding is the *Cicada sanguinolenta*, but of a deep black colour, with two scarlet bands across the wings, the body being varied with red and black.

Among the most singular Cicadæ are those in which the thorax is raised perpendicularly into a large and flat leaf-like membrane or process: these are of exotic extraction, and the most remarkable is the *Cicada rhombea* of Linnæus, which is a native of Jamaica, and of a brown colour: the thoracic process is of a rhomboid shape, and widest at the hind part.

NOTONECTA.

striata



glauca c̄ larva

M. Griffith sculp

1805, Octr. 1 London, Published by G. Kearsley, Fleet Street.

NOTONECTA. NOTONECTA.

Generic Character.

Rostrum inflexum.	*Snout* inflected.
Antennæ thorace breviores.	*Antennæ* shorter than thorax.
Alæ quatuor, cruciato-complicatæ.	*Wings* coriaceous on the upper part, and crossed over each other.
Pedes posteriores pilosi, natatorii.	*Hind-Feet* edged with hairs, and formed for swimming.

THE principal species of this genus is the *Notonecta glauca*, a very common aquatic insect, inhabiting stagnant waters, and generally measuring about three parts of an inch in length. Its colour is grey-brown, and the upper wings are marked along the edges by a row of minute black specks. This insect is usually seen swimming on its back, in which situation it bears a most striking resemblance to a boat in miniature, the hind-legs acting like a pair of oars, and impelling the animal at intervals through the water. It preys on the smaller inhabitants of the water, and flies only by night.

Notonecta striata is much smaller than the preceding, not measuring more than a quarter of an inch in length, and is of a yellowish grey colour,

with numerous transverse undulated black lines or streaks: it is found in stagnant waters.

Notonecta minutissima is an extremely small species, with grey wings, marked by longitudinal dusky spots: like the two former, it is an inhabitant of stagnant waters, but is far less frequently observed than the rest, on account of its very small size.

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NEPA.

cinerea

1805, Octr 1 London, Published by G. Kearsley, Fleet Street.

NEPA. NEPA.

Generic Character.

Rostrum inflexum.	*Snout* inflected.
Alæ quatuor, cruciato-complicatæ, antice coriaceæ.	*Wings* four, cross-complicate, coriaceous on the upper part.
Pedes anteriores cheliformes, reliqui quatuor ambulatorii.	*Fore-Feet* cheliform, the rest formed for walking.

THIS genus, like that of Notonecta, is aquatic, inhabiting stagnant waters, and preying on the smaller water-insects, &c. The largest species yet known, and which very far surpasses in size all the European animals of the genus, is the *Nepa grandis*, which is a native of Surinam and other parts of South-America, often measuring more than three inches in length. Its colour is a dull yellowish brown, with a few darker shades or variegations: the under wings are of a semitransparent white colour, and the abdomen is terminated by a short tubular process. Madam Merian represents this species, in her Surinam Insects, as preying on tadpoles and young frogs.

Nepa cinerea or the Common Water-Scorpion,

is a very frequent inhabitant of stagnant waters in our own country, measuring about an inch in length, and appearing, when the wings are closed, entirely of a dull brown colour; but, when the wings are expanded, the body appears of a bright red colour above, with a black longitudinal band down the middle: and the lower wings, which are of a fine transparent white, are decorated with red veins: from the tail proceeds a tubular bifid process or style, nearly of the length of the body, and which appears single on a general view, the two valves of which it consists being generally applied close to each other throughout their whole length. The animal is of slow motion, and is often found creeping about the shallow parts of ponds, &c. In the month of May it deposits its eggs on the soft surface of the mud at the bottom of the water: they are of a singular shape, resembling some of the crowned seeds, having an oval body, and an upper part surrounded by seven radiating processes or curved spines: the young, when first hatched, are not more than the eighth of an inch in length. The Water-Scorpion flies only by night, when it wanders about the fields in the neighbourhood of its native waters. The larvæ and pupæ differ in appearance from the complete insect in having only the rudiments of wings, and being of a paler or yellower colour.

Nepa cimicoides of Linnæus differs materially from the preceding species, and has, at first view, more the aspect of a Notonecta than a Nepa, the

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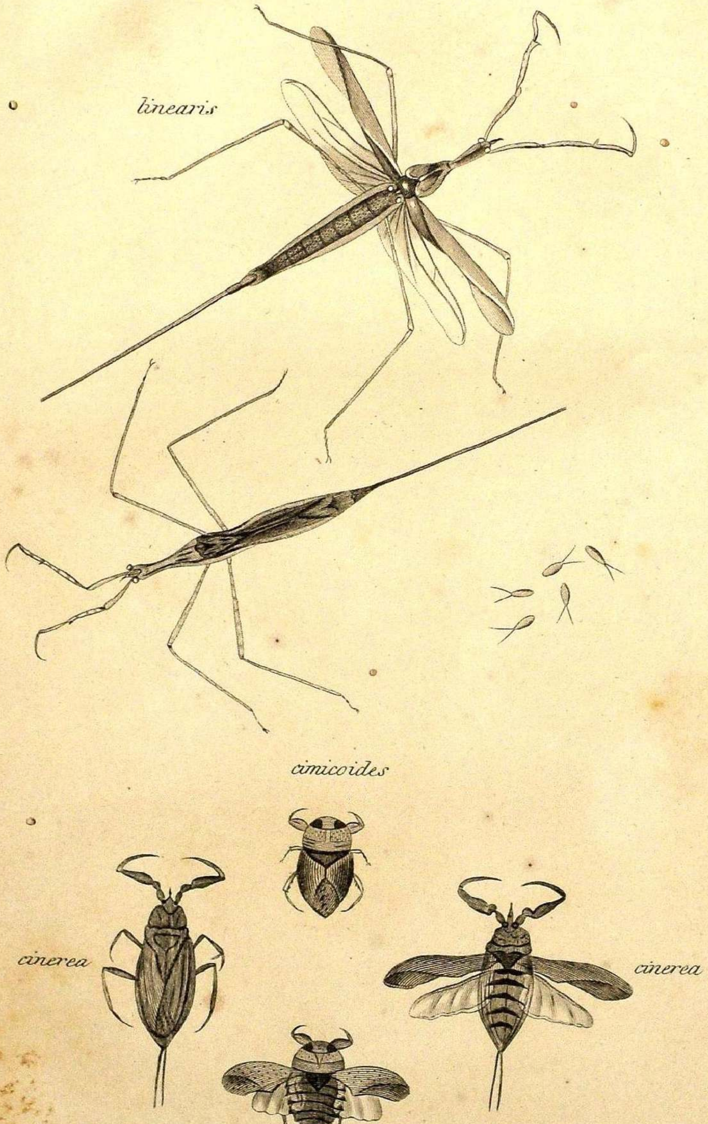
NEPA.



M. Griffiths sculp.

1805 Oct.r 1 London Published by G. Kearsley, Fleet Street.

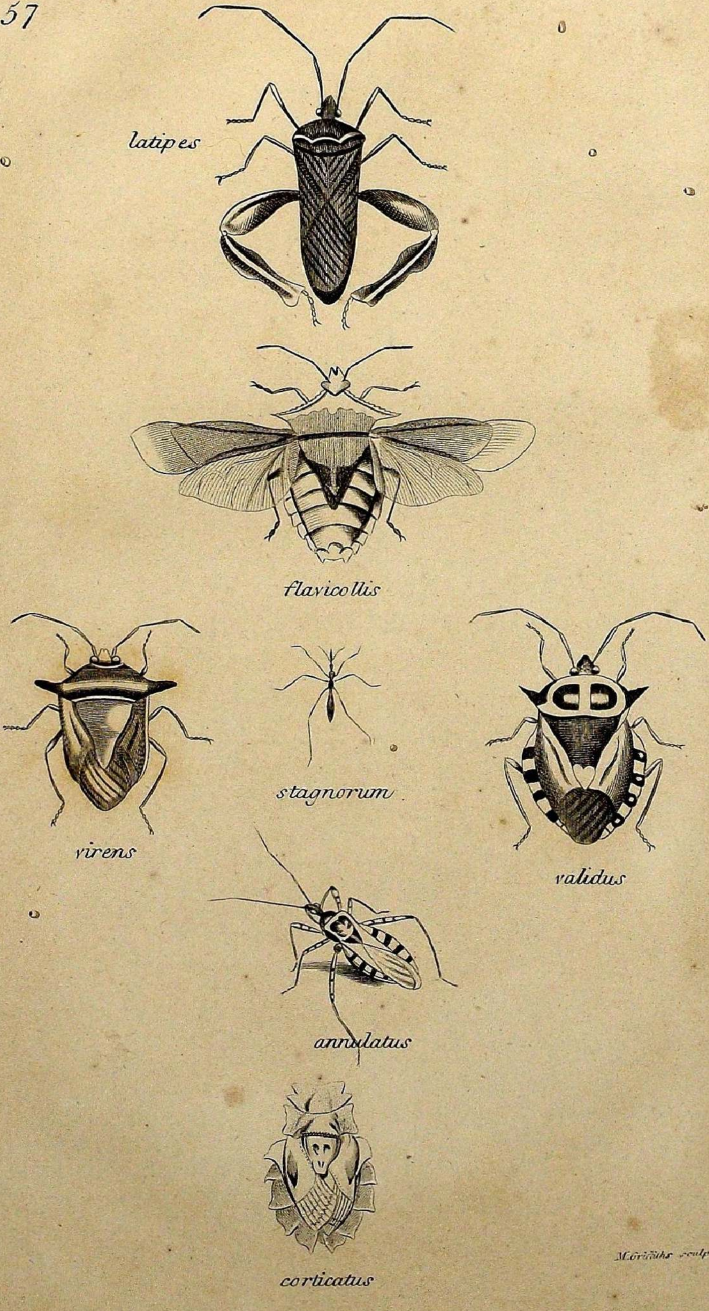
hind legs being formed for swimming briskly, and furnished with an edging of hairs on the inner side: it also bears a resemblance to the generality of the Cimices, in its broadly ovate shape: the thorax and upper wings are pale brown; the lower wings transparent white, and the back, which appears only when the wings are expanded, is of a fine blueish black: the sides of the abdomen are serrated: the under surface is of a pale yellowish brown, with blue-green thorax: the fore-feet or chelæ are very short, and the abdomen is simple, or destitute of any lengthened process. This insect is less common than the preceding, but is found in similar situations.

Nepa linearis is an insect of a highly singular aspect, bearing a distant resemblance to some of the smaller insects of the genus Mantis and Phasma. It measures about an inch and half from the tip of the snout to the beginning of the abdominal style or process, which is itself of equal length to the former part, and the whole animal is extremely slender in proportion to its length: the legs also are long and slender, and the chelæ or fore-legs much longer in proportion than those of the second species or Nepa cinerea: the colour of the animal is dull yellowish brown, the back, when the wings are expanded, appearing of a brownish red, and the under wings white and transparent. It inhabits the larger kind of stagnant waters, frequenting the shallower parts during the middle of the day, when it may be observed to prey on the smaller water insects, &c.

Its motions are singular; often striking out all its legs in a kind of starting manner at intervals, and continuing this exercise for a considerable time. The eggs are smaller than those of the Nepa cinerea, of an oval shape, and furnished with two processes or bristles divaricating from the top of each.

57

CIMEX.



M. Griffiths sculp.

1805 Oct.r 1st London, Published by G. Kearsley, Fleet Street.

CIMEX. BUG.

Generic Character.

Rostrum inflexum.	*Snout* inflected.
Antennæ thorace longiores.	*Antennæ* longer than thorax
Alæ quatuor, cruciato-complicatæ, superioribus antice coriaceis.	*Wings* four, cross-complicate, the upper pair coriaceous on the upper part.
Dorsum planum, thorace marginato.	*Back* flat, with the thorax margined.
Pedes cursorii.	*Feet* formed for running.

OF this very numerous genus one species alone is apterous or destitute of wings; viz. that troublesome and offensive insect the *Cimex lectularius* or common domestic Bug; now so frequent a nuisance in the metropolis as well as in most parts of the country, though in a great degree unknown in England in the days of our ancestors. It is indeed affirmed by a writer* who has given a professed

* See "*A Treatise of Bugs*" by J. Southall. Lond. 1730. 8vo. This man, who practised the art of destroying these insects in houses, affirms with confidence that the application of his liquor, (the receipt of which he obtained from an old Negro in America,) to the holes or crevices of places containing them, immediately caused them to come out in great numbers and immediately die. "On the application, (says he) of this liquor, at all seasons of the year, they will come out, and immediately die before your face."

treatise on this animal, that it was scarcely known in England before the year 1670, when it was imported among the timber used in rebuilding the city of London after the great fire of 1666. That it was however known much earlier is hardly to be doubted, though probably far less common than at present; since Mouffet informs us that Dr. Penny, one of the early compilers of that History of Insects, relates his having been sent for in great haste to Mortlake in Surry to visit two noble ladies who imagined themselves seized with the usual symptoms of the plague; but on Penny's demonstrating to them the true cause of their complaint, viz. having been bitten by these insects, and even detecting them in their presence, the whole affair was turned into a jest. This was in the year 1583.

To give a particular description of an animal so well known would be superfluous: it may be sufficient to observe, that it is of an oval shape, about the sixth of an inch in length, of a very compressed or flat form, and of a reddish brown colour. It is easily destroyed by pressure, being of a very tender nature, and when bruised diffuses a highly unpleasant smell. In the beginning of summer it deposits its eggs, which are very small, white, and of an oval shape, each standing on a kind of short pedicle or footstalk, in the cavities of walls or wood-work, and from these are hatched, in the course of a few weeks*, the young, which

* Three weeks, according to Southall.

differ from the parent insect in no other respect than size and colour, being at first much paler than when more advanced in their growth; not arriving at their full size in less than about three months. They live entirely by suction, employing for this purpose their sharp and fine trunk or proboscis, which is carried in a strait direction beneath the breast. It is probable that this insect, like the Gnat and some others, at first infuses some quantity of irritating fluid into the wound it makes, before it sucks the blood of the animal it attacks, since the swelling which it causes is often very considerable, and attended with severe itching. During the winter months these animals secrete themselves behind walls, wainscotting, or any neglected places, where they are capable of supporting the most intense frost without injury, and on the return of warm weather again emerge from their concealment. When confined in a box for any length of time they will often attack and destroy each other. It is affirmed by Scopoli, whose observations are, in general, distinguished by great accuracy, that this insect, in the Dutchy of Carniola, is, at certain seasons, furnished with wings, though apterous in other parts of Europe. Mr. Baker, in his work entitled "*The Microscope made easy*," informs us that the Bug is one of the best subjects for exhibiting a microscopic view of the circulation of the blood. "In the legs of small punices or Bugs (says this writer) the circulation is remarkably visible, together with an extraordinary vibration of the vessels, which I

have never observed in any other creature: in these too, if clear, as they may sometimes be found, the wonderful motions of all the internal parts will afford an agreeable entertainment to the curious, and may be examined as long and as often as they please; for I have kept a Bug alive in a slider between two pieces of isinglass at least six weeks together, notwithstanding it was confined so close as to be uncapable of stirring; and although during that time it often seemed dead and motionless when I placed it before the microscope, a little warmth would set the bowels in motion, and renew the current of the blood as briskly as ever."

A variety of this Insect is sometimes seen, which is generally known by the name of the American Bug; it is of a longer shape than the common species.

So very numerous is the genus Cimex, that it is found necessary to divide it into several sections, according to the general shape or habit of the Insects. Among those in which the scutellum or triangular part between the setting on of the wings is of equal length with the body the *Cimex lineatus* may serve as an example, which is of a black colour, varied with yellow, having five yellow lines down the thorax, and three on the scutellum, and the abdomen yellow with black spots. It is a native of Barbary and some of the Southern parts of Europe.

Of those in which the upper wings are of a much more strong or coriaceous nature than the

rest, so as to give the insects an appearance somewhat resembling the beetle tribe, we may select, as an example, the *Cimex clavicornis*, a smallish species, of a yellowish grey colour, and of an oval shape, with strongly veined and reticulated wings, and clavated antennæ. It is found in many parts of Europe.

Of the flat or membranaceous species the most remarkable is the *Cimex corticatus* of Drury, which is a native of the Brasils, and measures near an inch in length: its colour is a pale yellowish or reddish brown, and its whole aspect rather resembles a piece of thin vegetable bark, cut or nicked into the form of an insect.

Of those in which the thorax is sharply spined on each side, the *Cimex acantharis* is one of the most remarkable: it is of an oblong shape, with the abdomen as well as the thorax sharply spined on the edges: its colour is brown and it is a native of Jamaica.

Of those in which the shoulders project on each side into the form of an obtuse spine, the common English species called the Green Cimex, *Cimex baccarum* of Linnæus may stand as an example: this insect, which is of a beautiful green colour, measures nearly half an inch in length, and when the wings are expanded the back appears of a fine blueish black colour. It is observed towards the end of Summer in fields and gardens, and often varies in being of a brown rather than a green colour.

Among those with setaceous antennæ is the

Cimex personatus, of a black colour, a lengthened shape, and an unpleasant aspect: its larva however is still much more so, appearing generally as if enveloped in a rough coating of grey dust, or fragments of down, &c. owing to the natural viscidity of its body and limbs, and its frequenting neglected corners of houses among dust, &c. It is an enemy to the common house-bug, and destroys it wherever it finds it, but, if it were possible to introduce it in sufficient quantity for this purpose, the remedy, as Degeer very properly observes, would be far worse than the complaint; since it has the same propensity with the common bug, and is of a much larger size, and of a more disagreeable aspect. The complete insect flies only by night, and appears towards the decline of summer.

Of the oblong-bodied Cimices the *Cimex Hyoscyami* is one of the most remarkable, and is a beautiful insect: it is not uncommon on the plant Henbane, and is of a bright red and black colour, with brown wings.

Among those with setaceous antennæ of the length of the body is the *Cimex Populi:* its colour is a clouded variegation of black, brown, and white: it is found on the Aspen-tree.

Of those with spiny legs, one of the most remarkable is the *Cimex phyllopus*. It is of a blackish colour, with a pale band across the upper part of the wings; and the tibiæ or second joints of the hind-legs are expanded into a kind of leaf-like appearance, and marked with white spots: it is a

native of North-America and the West-Indian islands.

Lastly, of those which are of an extremely long or linear form, none are so remarkable as the *Cimex stagnorum* of Linnæus, which is often seen slowly wandering about the surface of stagnant waters. It measures something more than half an inch in length, and is entirely of a deep black colour: it is distinguished by the remarkable circumstance of a round globule, situated on each side the middle of the thorax.

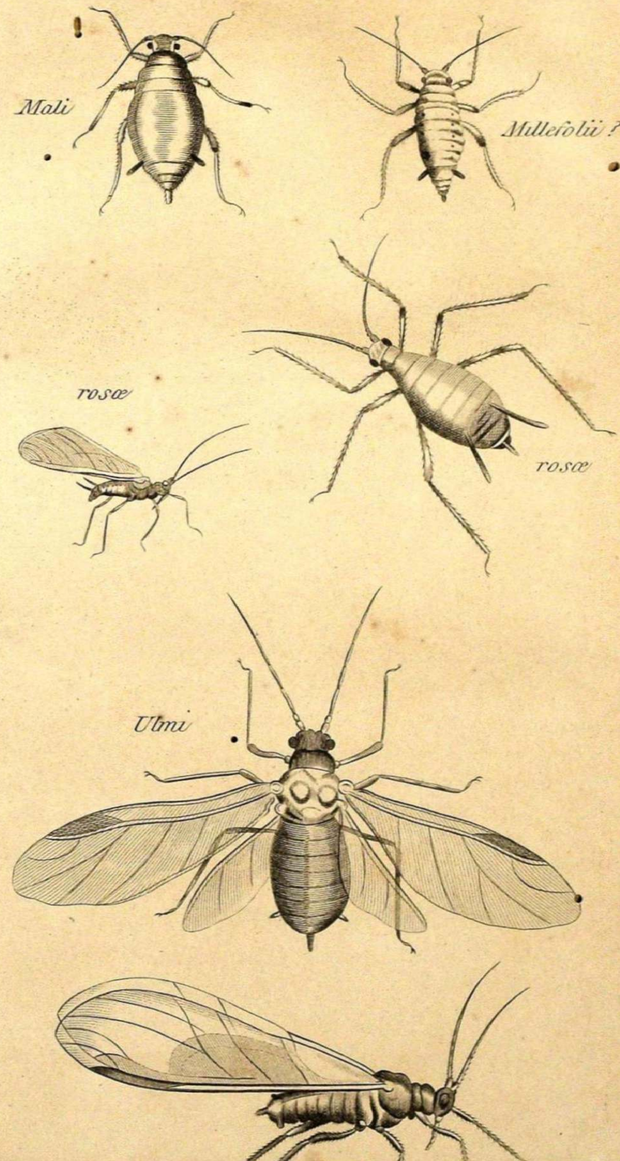
Cimex lacustris is also found on the surface of stagnant waters, but is of a less lengthened form than the preceding, of a brown colour, and in its motions is a perfect contrast to the former; springing with wonderful velocity, in all directions, over the waters, and generally assembling in considerable numbers during the hotter part of the day. It is described by Mouffet and others under the title of Tipula, and is supposed to have been the Tipula of the ancients.

APHIS. APHIS.

Generic Character.

Rostrum inflexum.	*Snout* inflected.
Antennæ thorace longiores.	*Antennæ* longer than thorax.
Alæ quatuor erectæ, aut nullæ.	*Wings* either four upright, or none.
Pedes ambulatorii.	*Feet* formed for walking.
Abdomen postice sæpius bicorne.	*Abdomen* generally furnished with two horns or processes.

FROM a great degree of general similarity in the insects of this genus, their true specific characters are often very difficultly determinable. They frequent the leaves, stems, and tender shoots of plants and trees, and are popularly known by the name of Plant-Lice. They are observed to be viviparous in summer, and oviparous in autumn; but the most wonderful part of their history is the power of continued impregnation, through a great many descents, as far as the fifth, eighth, twelfth, and even, according to some observations, the twenty-seventh generation. A pregnant female Aphis, kept by itself, produces perfectly formed young ones, which, though kept separate, will, after a certain period, produce others, which



M. Griffith sculp.

Aphides slightly magnified

1805, Oct. 1 London, Published by G. Kearsley, Fleet Street.

are also themselves impregnated, and thus the breed may be continued as before mentioned.

This wonderful faculty in the insects of the present genus appeared, at its first publication, so extraordinary as to excite no small degree of scepticism in the philosophical world. The observations however of Bonnet, Reaumur, Lyonett, and others have amply confirmed its truth. Leewenhoek had long before observed that these insects were viviparous. Bonnet, whose observations were continued with the utmost accuracy, assures us that the female Aphides continue to produce their young throughout the whole summer; that the males appear only in autumn; and that the females are at that period oviparous. The ova which are thus deposited during the autumn do not hatch till the succeeding spring. It is however uncertain whether the same individual insects which have produced perfect young during the summer become oviparous during the autumn, or whether the oviparous autumnal ones ever produce living young; the preceding observations relating only to the species at large.

The Aphides in general are very prolific insects. Reaumur computes that each Aphis may produce about ninety young, and that, in consequence, in five generations, the descendants from a single insect would amount to five thousand nine hundred and four million, nine hundred thousand.

The Aphides are very prejudicial to many trees and plants by absorbing the juices of the tender shoots and leaves, which latter they cause to

cockle or warp in such a manner as to form one or more large concavities beneath, and in which the insects generally reside in great multitudes. In some years they are so numerous as to cause almost a total failure of hop and potatoe plantations: in other years the pease are equally injured, while exotics raised in stoves and green-houses are frequently destroyed by their depredations. They are also supposed to be the chief, if not the sole cause of that viscid exsudation or moisture so often observed on the leaves of various trees, and popularly known by the title of honey-dew; which is said to be nothing more than the excrementitious substance evacuated by these insects from the hinder part of the body and from the two tubular processes at the tip of the abdomen.

Of the British Aphides one of the largest and most remarkable is the *Aphis Salicis*, which is found on the different kinds of Willows, and is nearly a quarter of an inch in length, and of a yellowish grey colour, spotted with black. When bruised these insects stain the fingers of a red colour. Towards the end of September, according to the observations of Mr. Curtis, multitudes of the full grown insects of this species, both winged and others, desert the willows on which they feed, and ramble over every neighbouring object in such numbers that we can handle nothing in their vicinity without crushing some of them; while those in a younger or less advanced state still remain in large masses upon the trees.

Aphis Millefolii of Degeer, or the Yarrow Aphis

is so named from its being principally found on that well-known plant. It is a rather small species, and is of a green colour, spotted with black: the males are generally winged, and are smaller and more slender than the females.

Aphis Rosæ or Rose Aphis is very frequent during the summer months on the young shoots and buds of roses: its size is nearly similar to that of the Yarrow Aphis, and its colour a bright green: the males are furnished with large transparent wings.

Aphis Tiliæ or the Lime-Trees Aphis is one of the most beautiful of the genus. It is of nearly the same size with the Aphis Rosæ, but of a pale greenish yellow colour, with a row of black, crescent-shaped spots down each side of the abdomen, and a black stripe on each side the thorax: the wings are beautifully transparent, with brown nerves or veins, a black edging down the shoulder-part, and several dusky patches toward the tips.

In the sixth volume of the Transactions of the Linnæan Society of London we find an excellent paper on the subject of these animals by the late ingenious Mr. Curtis. "The leaves (says he) of such trees and plants as have a firm texture and strong fibres, though infested with these insects, preserve their form; but the more tender foliage of others, and flowers in general, cannot bear their punctures without curling up and becoming distorted; in consequence of which they lose their beauty entirely and irretrievably. The cultivators of plants, especially in stoves and greenhouses,

cannot be too much on their guard against the whole tribe of Aphides; for with what pleasure can a large choice collection be viewed, when there is scarcely a plant but what exhibits symptoms of disease occasioned by vermin?"

"As the species of this genus are very numerous, and afford but few marks of distinction, Linnæus has contented himself with giving most of them trivial names according to the particular plant on which they are found: a close attention to them will however disclose more distinctive characters than naturalists are aware of. Of some of the circumstances attendant on the propagation of these minute animals accounts are related, deviating so wonderfully from the common course of Nature, that they could not be credited, were not the authors of them known to be men of the nicest and most accurate observation, and of the strictest veracity. On this part of the subject I have little to say from my own observation, but as some account of so extraordinary a part of their history may be expected in a paper of this sort, I shall state the facts, simply observing, that neither in the *Aphis Salicis*, which at times I have watched with great attention, nor in any other species of *Aphis*, did I ever observe any sexual intercourse to take place. Whether this may have arisen from the extreme infrequency of such a procedure, or from my not having observed these insects at a proper time of the year, I know not; but most undoubtedly such intercourse does not take place between the different sexes of Aphis as in other

insects. Yet Mons[r]. Bonnet, who may be said to have almost taken up his abode with these insects, informs us that he has frequently noticed such connexion, which he describes as taking place at one certain time of the year only; and that from a female thus impregnated, many successive generations will be produced without any farther impregnation. He took the Aphides as soon as brought forth, and kept each individual separate. The females of such brought forth abundance of young. He took the young of these, and treated them precisely in the same manner. The produce was the same: and thus he proceeded to the ninth generation with the same success; and so far from considering that as the utmost extent of the effect, he thinks it might be carried on to the thirtieth generation. In most species of Aphides, both males and females acquire wings at certain seasons; but in this respect they are subject to great variation, there being some males and some females that never have wings; again there are some females that become winged, while others of the same species do not. In the quality of the excrement voided by these insects there is something very extraordinary. Were a person accidentally to take up a book in which it was gravely asserted that in some countries there were certain animals which voided liquid sugar, he would soon lay it down, regarding it as a fabulous tale, calculated to impose on the credulity of the ignorant; and yet such is literally the truth. The superior size of the *Aphis salicis* will enable the most common

observer to satisfy himself on this head. On looking stedfastly for a few minutes on a groupe of these insects while feeding on the bark of the willow, one perceives a few of them elevate their bodies, and a transparent substance evidently drop from them, which is immediately followed by a similar motion, and discharge like a small shower from a great number of others. At first I was not aware that the substance thus dropping from these animals at such stated intervals was their excrement, but was convinced of its being so afterwards; for on a more accurate examination I found it proceed from the extremity of the abdomen, as is usual in other insects. On placing a piece of writing-paper under a mass of these insects, it soon became thickly spotted: holding it a longer time, the spots united from the addition of others, and the whole surface assumed a glossy appearance. I tasted this substance, and found it as sweet as sugar. I had the less hesitation in doing this, having observed that wasps, ants, flies, and insects without number, devoured it as quickly as it was produced; but were it not for these, it might no doubt be collected in considerable quantities, and if subjected to the processes used with other saccharine juices, might be converted into the choicest sugar or sugar-candy. It is a fact also which appears worthy of noticing here, that though wasps are so partial to this food, yet the bees* appear totally to disregard it."

* Yet Mr. White in his History of Selborne observes that it is "very grateful to bees, who gather it with great assiduity."

"In the height of Summer, when the weather is hot and dry, and Aphides are most abundant, the foliage of trees and plants, (more especially in some years than others) is found covered with and rendered glossy by a sweet clammy substance known to persons resident in the country by the name of *honey-dew:* they regard it as a sweet substance falling from the atmosphere, as its name implies. The sweetness of this excrementitious substance, the glossy appearance it gave to the leaves it fell upon, and the swarms of insects this matter attracted, first led me to imagine that the honey-dew of plants was no other than this secretion, which farther observation has since fully confirmed. Others have considered it as an exsudation from the plant itself. Of the former opinion we find the Rev[d]. Mr. White, one of the latest writers on natural history that has noticed this subject. But that it neither falls from the atmosphere, nor issues from the plant itself is easily demonstrated. If it fell from the atmosphere, it would cover every thing indiscriminately, whereas we never find it but on certain living plants and trees. We find it also on plants in stoves and green-houses covered with glass. If it exsuded from the plant, it would appear on all the leaves generally and uniformly; whereas its appearance is extremely irregular, not alike on any two leaves of the same tree or plant, some having none of it, and others being covered with it but partially. But the phænomena of the honey-dew, with all their variations, are easily accounted for by con-

sidering the Aphides as the authors of it. That they are capable of producing an appearance exactly similar to that of the honey-dew has already been shewn. As far as my own observation has extended, there never exists any honey-dew but where there are Aphides; such however often pass unnoticed, being hid on the under-side of the leaf. Wherever honey-dew is observable about a leaf, Aphides will be found on the under side of the leaf or leaves immediately above it, and under no other circumstances whatever. If by accident any thing should intervene between the Aphides and the leaf next between them, there will be no honey-dew on that leaf. Thus then we flatter ourselves to have incontrovertibly proved that the Aphides are the true and only source of the honey-dew."

"We have found that where the saccharine substance has dropped from Aphides for a length of time, as from the Aphis salicis in particular, it gives to the surface of the bark, foliage, or whatever it has dropped on, that sooty kind of appearance which arises from the explosion of gunpowder, which greatly disfigures the foliage, &c. of plants. It looks like and is sometimes mistaken for a kind of black mildew. We have some grounds for believing that a saccharine substance similar to that of the Aphis drops from the Coccus also, and is finally converted into the same kind of powder."

"In most seasons the natural enemies of the Aphides are sufficient to keep them in check, and

to prevent them from doing any essential injury to plants in the open air. But seasons sometimes occur,, very irregularly indeed, on an average, perhaps once in four or six years, in which they are multiplied to such an excess, that the usual means of diminution fail in preventing them from doing irreparable injury to certain crops. In severe winters we have no doubt that Aphides are very considerably diminished: in very mild winters we know they are very considerably increased; for they not only exist during such seasons, but continue to multiply. Their enemies, on the contrary, exist, but do not multiply, at least in the open air, during such periods; and thus the Aphis gets the start of them, and acquires an ascendancy, which once acquired is not easily overcome by artificial means, upon a large scale at least, in the open air. Vain would be the attempt to clear a hop-garden of these pernicious vermin, or to rescue any extensive crop from their baneful effects. Violent rains attended with lightning have been supposed to be very effectual in clearing plants of them; but in such case more is to be attributed to the plants being refreshed, and made to grow by the rain, of which they stood in need, than to any destruction of the Aphides themselves, which, on accurate examination, will be found to be as plentiful after such rains as they were before; nor is wet so injurious to these insects as many imagine, as is evident from the following experiment. On the 12th of May 1799, I immersed in a glass of water the footstalk of a

leaf of considerable length, taken from a stove plant beset with Aphides of a dark lead-colour, which were feeding on it in great numbers. On immersion they did not quit the stalk, but immediately their bodies assumed a kind of luminous appearance from the minute bubbles of air which issued from them. They were put under water at a quarter past six in the evening, and taken out at a quarter past ten the next morning, having continued immersed sixteen hours. On placing them in the sunshine some of them almost immediately shewed signs of life, and three out of four at least survived the immersion. One of the survivors, a male, very soon became winged, and another, a female, was delivered of a young one. Many years before this experiment, with a view to destroy the Aphides, which infested a plant in my green-house, I immersed one evening the whole plant, together with the pot in which it grew, in a tub of water. In the morning I took out the plant, expecting with certainty to find every Aphis dead; but to my great surprize they soon appeared alive and well: and thus in addition to the other extraordinary phenomena attendant on these insects, we find that they are capable of resisting the effects of immersion in water for a great length. When taken from the plant on which they feed and kept under water, they do not survive so long; their struggling in that case perhaps exhausts them sooner. This part of the subject might perhaps be pushed much farther: it is sufficient for our purpose to have shewn that

wet is not so hurtful to them as is generally imagined."

"Though no mode of destroying Aphides will perhaps ever be devised on a large scale in the open air by artificial means, we can accomplish it most effectually when they infest plants in green-houses and frames, or in any situation in which we can envelop them for a certain time in clouds of smoke. Powders or liquids, however fatal to Aphides, must ever be ineffectual, from the trouble and difficulty of applying them so that they shall come in contact with those insects, situated as they usually are; but in this respect smoke has every advantage; it penetrates and pervades their inmost recesses. The smoke of common vegetables, however powerful, is found to be inadequate to their destruction, and hitherto no other than that of Tobacco is found to be effectual. That, judiciously applied, completely answers the purpose, without injuring the plant. It mostly happens, in well managed houses, that a few plants only are infested with Aphides; in such a case the smoking of the whole house is a business of unnecessary expence and trouble; and we would recommend it to persons who have large collections to make use of a box of a commodious form that shall hold about a dozen plants of various sizes, to be used as a sort of hospital, in which the infested plants may be smoaked separately, and the insects more effectually destroyed, because it may be rendered more perfectly smoke-tight."

"To prevent the calamities which would infallibly result from the accumulated multiplication

of the more prolific animals, it has been ordained by the Author of Nature that such should be diminished by serving as food for others. On this principle we find that most animals in this predicament have one or more natural enemies. The helpless Aphis, the scourge of the vegetable kingdom, has to contend with many. The principal are the *Coccinella*, the *Ichneumon Aphidum*, and the *Musca aphidivora*. Such as are unacquainted with the history of insects will learn with surprise that the Coccinella, a common insect, well known even to children by the name of the Lady-Bird, is one of the greatest destroyers of the Aphides, which indeed are its only food, its sole support, as well in its perfect as in its larva or grub state. During the severity of winter this insect secures itself under the bark of trees or elsewhere. When the warmth of spring has expanded the foliage of plants, the female deposits its eggs on them in great numbers, from whence in a short time proceeds the larva, a small grub, of a dark lead-colour spotted with orange: these may be observed in the summer season running pretty briskly over all kinds of plants; and if narrowly watched, they will be found to devour the Aphides wherever they find them. The same may be observed of the Lady-Bird in its perfect state. As these insects in both their states are very numerous, they contribute powerfully to diminish the number of Aphides. Another most formidable enemy to the Aphis is a very minute black and slender Ichneumon fly, which eats its way out of the Aphis, leaving the dry inflated skin

of the insect adhering to the leaf like a small pearl. Such may always be found where Aphides are in plenty. We have observed different species of Aphides to be infested with different Ichneumons. In general the torpid Aphis submits quietly to this fatal operation; but we have observed some of them, especially one that feeds on the Sycamore, which is much more agile than many of this race, endeavouring to avoid the Ichneumon with great address. There is perhaps no genus of insects which in their larva or maggot state feed on such a variety of food as the *Musca* or Fly. There is scarcely a part of Nature, either animate or inanimate, in which they are not be met with. One division of them, called by Linnæus *Muscæ aphidivoræ*, feeds entirely on Aphides. Of the different species of aphidivorous flies, which are numerous, having mostly bodies variegated with transverse stripes, their females may be seen hovering over plants infested with Aphides, among which they deposit their eggs on the surface of the leaf. The larva or maggot produced from such eggs feeds, as soon as hatched, on the younger kinds of Aphis, and as it increases in size, attacks and devours those which are larger. These larvæ are usually of a pale colour, adhere closely to the leaf, along which they slowly glide, and are formed very tapering towards the head. When fully grown they change to a pupa or chrysalis attached to the leaf, from whence issues the fly. The larvæ of these flies contribute their full share to diminish the despoilers of Flora. To these three kinds of

insects, which are the chief agents in the hands of Nature for keeping the Aphides within their proper limits, we may add a few others, which act a subordinate part in this necessary business of destruction. The larva of the *Hemerobius* feeds on them in the same manner as that of the Musca aphidivora, and deposits its eggs also on the leaves of such plants as are beset with Aphides. The eggs of this Hemerobius stand on long filaments, which are attached by a base to the leaf, and have more the appearance of filaments of flowers with their antheræ than the eggs of an animal. The number of these insects being comparatively small, they may be considered rather as the casual invaders of their existence than the main host of their destroyers. The Earwig, which is itself no contemptible enemy to plants, makes some atonement for its depredations by destroying the Aphides, especially such as reside in the curled-up leaves of fruit-trees, and the purses formed by certain Aphides on the poplars and other trees. Lastly, we may add as the enemies of these creatures, some of the smaller soft-billed birds, which generally feed on insects, and which may be frequently seen busily employed in picking them from the plants."

"When plants assume a sickly appearance, or are disguised by disease, from whatever cause the disease may arise, they are said to be blighted. Blights originate from a variety of causes, the chief of which are unfortunate weather, and insects. Two opinions prevail very generally in

regard to blights: the one that the insects which cause them are brought from a distance by easterly winds; the other that they attach themselves to none but plants already sickly. Neither of these opinions, as far as I have observed, is founded in fact. I am induced from the numerous observations I have made on insects for a series of years, (in pursuing the cultivation of plants) to consider the Aphis as by far the most general cause of the diseases distinguished by the name of Blights. Other insects it is true, more especially the larvæ of some of the Lepidoptera, as those of the *Phalænæ tortrices*, disfigure and do infinite mischief to plants by rolling and curling up the leaves; but these for the most part confine themselves to certain trees and plants. Their ravages are also of shorter duration, being confined to the growth of one brood, and they are also less fatal. It would be no difficult matter for me to fill a volume with observations to which I have been an eye-witness of the injuries which plants sustain from insects; but that would be foreign to my present purpose, which is to shew that the Aphis is the grand cause of these diseases, and to place the modus operandi or manner in which they effect this business in its true light."

"We are fully aware that certain gregarious insects may at particular times rise up in the air, and if small and light, be impelled by any wind that may chance to blow at the time; and on this principle we account for that shower of Aphides described by Mr. White to have fallen at Selborne.

But certainly this is not the mode in which those insects are usually dispersed over a country. The phænomenon is too unusual, the distribution would be too partial; for the Aphides, while at their highest point of multiplication, do not swarm like bees or ants, and fly off in large bodies; but each male or female Aphis, at such periods as they arrive at maturity, marches or flies off, without waiting for any other. Yet it may happen, that from a tree or plant thickly beset with them numbers may fly off, or emigrate together, being arrived at maturity at the same moment of time. Detaching itself from the plant, each pursues a different route, intent on the great business of multiplying its species; and settles on such plants in the vicinity as are calculated to afford nourishment to its young. The common green Aphis, which is so generally destructive, lives during the winter season on such herbaceous plants as it remained on during the autumn, either in its egg or perfect state. If the weather be mild, it multiplies greatly on such herbage; as the spring advances, in May the males and females of these insects acquire wings; and thus the business of increase, hitherto confined, is widely and rapidly extended, as the winged Aphides, by Hop-Planters called the Fly, may be seen at this period very generally sitting on plants, and floating in the air in all directions."

Mr. Curtis, in the preceding observations on the genus Aphis, having mentioned the shower of Aphides recorded by Mr. White, it cannot but be agreeable to the reader to be made acquainted

with so curious a phenomenon in the words of its describer.

"As we have remarked above that insects are often conveyed from one country to another in a very unaccountable manner, I shall here mention an emigration of small Aphides, which was observed in the village of Selborne no longer ago than August the first 1785. At about three o'clock in the afternoon of that day, which was very hot, the people of this village were surprised by a shower of Aphides or smother-flies, which fell in these parts. Those that were walking in the streets at that juncture found themselves covered with these insects, which settled also on the hedges and gardens, blackening all the vegetables where they alighted. My annuals were discoloured with them, and the stalks of a bed of onions were quite coated over for six days after. These armies were then no doubt in a state of emigration, and shifting their quarters; and might have come, as far as we know, from the great hop-plantations of Kent or Sussex, the wind being all that day in the easterly quarter. They were observed at the same time in great clouds about Farnham, and all along the vale from Farnham to Alton."

CHERMES. CHERMES.

Generic Character.

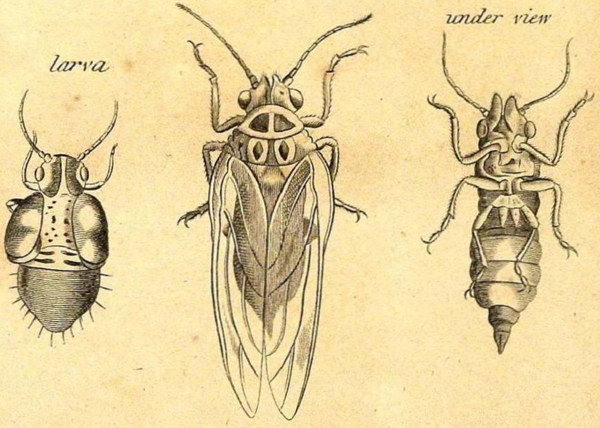
Rostrum pectorale.	*Snout* pectoral.
Antennæ thorace longiores.	*Antennæ* longer than thorax.
Alæ quatuor, deflexæ.	*Wings* four, deflex.
Thorax gibbus.	*Thorax* gibbose.
Pedes saltatorii.	*Feet* formed for walking.

THE insects of the genus Chermes, like those of the genus Aphis, are found on the leaves, young shoots, and bark of various vegetables: they are, in general, of small size, and in their larva state are of a much more flattened form than when farther advanced, and exhibit merely the rudiments of the future wings: in this state also many of them appear coated, especially on the hind part of the body, with a flocculent or filamentous substance, of a white colour, and of a clammy or tenacious nature, which exsudes from the pores of the animal, and is gradually protruded into the form above-mentioned.

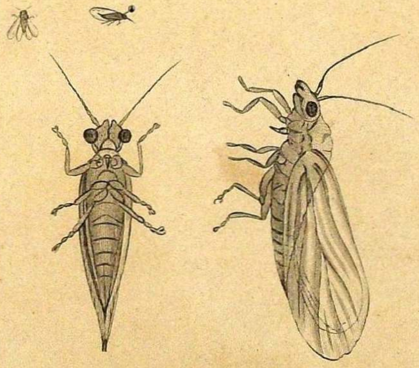
Chermis Alni is found on the leaves and shoots of the Alder. Its larva is entirely covered, about the hinder part, by thickly fasciculated heaps of viscid down or cotton, which, if purposely rubbed off, are quickly reproduced by the animal, which

Pyri

larva *under view*



Buxi



Buxi magnified

M. Griffiths sculp.

1805, Oct.r 1, London, Published by G. Kearsley, Fleet Street.

secretes the white fibres from large pores placed in a circle at some distance from the vent. These larvæ are gregarious, often appearing in such numbers on the shoots of the tree that the whole shoot appears covered with white cotton, which, if touched by the finger, separates into distinct tufts from the animals' being suddenly disturbed and moving in all directions. When this cotton is brushed off, the larva appears of a pale green colour, varied with black spots, which on the upper part of the abdomen are disposed in two longitudinal rows: the tip of the abdomen is also black. When arrived at its complete or perfect state by casting its pupa skin, it is entirely green, with transparent wings veined with green and slightly shaded with brown. If disturbed, it leaps with much agility, frequently flying at the same time.

Chermes Pyri is nearly of similar size with the former, and is found on the leaves of the common pear-tree: its colour is a greenish brown, varied with deeper streaks, and the wings are nearly transparent, spotted with brown: the larva of this species is of a greenish brown, with darker spots, and is nearly naked, or destitute of the cottony secretion so remarkable on that of the preceding, but is beset with short whitish hairs towards the hinder part of the body.

Chermes Buxi is a beautiful little insect, of a bright grass-green colour, with the wings of a similar cast. Its larva resides on the young shoots

of box, in the early part of spring, and secretes a considerable quantity of whitish, viscid, and short filaments from the hind part, but not so as to envelop the body, which has generally more or less of a powdery appearance.

COCCUS. COCCUS.

Generic Character.

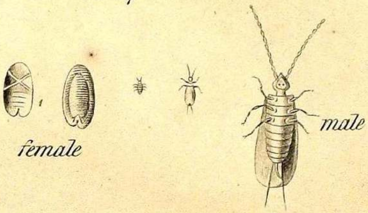
Rostrum pectorale.	*Snout* pectoral.
Abdomen postice setosum.	*Abdomen* bristled behind.
Alæ duæ erectæ masculis. Feminæ apteræ.	*Wings* two upright in the males. Females wingless.

In this remarkable genus the males are much smaller than the females, and of a widely different appearance, being furnished with wings, of which the females are altogether destitute. The Cocci are found on the leaves and bark of various vegetables: hence they become injurious to many exotics in our stoves and green-houses. Of these the *Coccus Adonidum* of Linnæus is the most common: the female, which, when nearly full grown, measures somewhat more than a fifth of an inch in length, has somewhat the appearance of a small millepede, or Oniscus, being of an oval shape, slightly convex above, with the body divided into many transverse segments projecting sharply on the sides, and furnished with small processes or points; which are longer on the two hindmost divisions of the body than on the rest, so as to give the appearance of a bifid tail. The whole insect is of a pale rose-colour, and appears more or less covered with a fine white

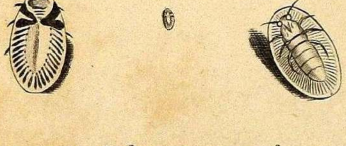
meal or powder: the legs are short and six in number. This insect continues to wander about the plant it infests, nourishing itself by sucking the juices. The male is very small, rose-coloured, somewhat mealy, with semitransparent milk-white wings, and four long filaments at the tail. When the female is full-grown, and pregnant with eggs, she ceases to feed, and remaining fixed to one spot, envelops herself in a fine white fibrous cotton-like substance, and lives but a very short time afterwards. The young, which hatch under the husk or body of the parent insect, proceeding from it in great numbers, and dispersing themselves in quest of food. This species is a native of the warmer parts of Africa and America, from whence it has long since been introduced, among exotics, into Europe.

Coccus Hesperidum is equally common in greenhouses with the former: the female of this species is a small, brown, oval insect, about the sixth of an inch in length, of a slightly convex, smooth surface, and furnished with six short legs. When full grown it does not envelop itself in any flocculent matter like the former, but remains firmly fixed on the bark, under the form of an oval convex shell or husk, of a polished brown colour. In this state it dies, giving birth to a numerous race of young, hatched from the included eggs, as in the former species. The male is a very small two-winged fly. This species of Coccus, like the former, has been introduced into the European regions from the warmer parts of the globe.

C. Hesperidum. var.



C. Alni Degeer farinosus Lin. Gmel
nat. size & magnified.

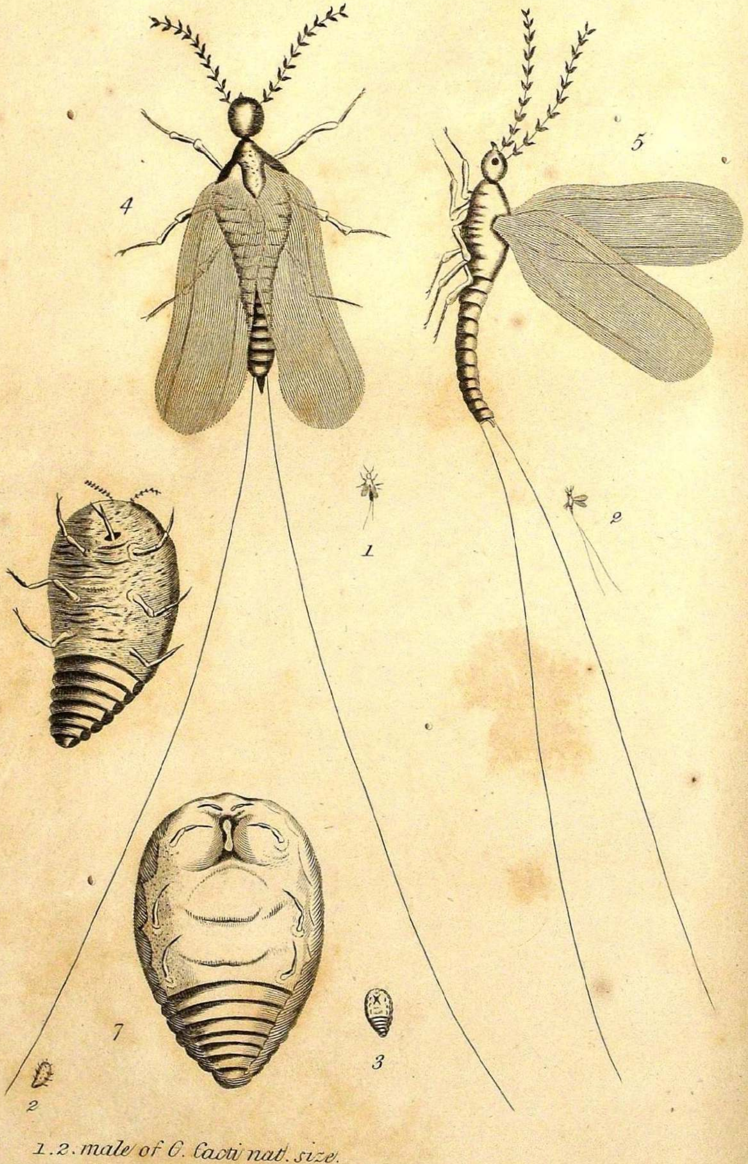


M. Griffith. sculp.

C. persicorum Sultzer nat. size & magnified

1805. Oct 1 London, Published by G. Kearsley, Fleet Street.

61 **COCCUS.**



1.2. male of C. Cacti nat. size.
2.3. female of d°.
4.5. male magnified.
6.7. female d°.

M Griffiths sculp.

1805, Oct. 1 London, Published by G. Kearsley, Fleet Street.

But of all the Insects of this genus by far the most important is the *Coccus Cacti* or Cochineel Coccus, so celebrated for the beauty of the colour which it yields when properly prepared. This species is a native of South-America, and is peculiarly cultivated in the country of Mexico, where it feeds on the plants called Cactus cochenillifer, and Cactus Opuntia. The female or officinal Cochineel insect, in its full-grown pregnant or torpid state, swells or grows to such a size, in proportion to that of its first or creeping state, that the legs, antennæ, and proboscis are so small with respect to the rest of the animal as hardly to be discovered except by a good eye, or by the assistance of a glass; so that on a general view it bears as great a resemblance to a seed or berry as to an animal. This was the cause of that difference in opinion which long subsisted between several authors; some maintaining that Cochineel was a berry; while others contended that it was an insect. We must also here advert to another error; viz. that the Cochineel was a species of Coccinella or Lady-Bird. This seems to have taken its rise from specimens of the *Coccinella Cacti* of Linnæus being sometimes accidentally intermixed with the Cochineel in gathering and drying.

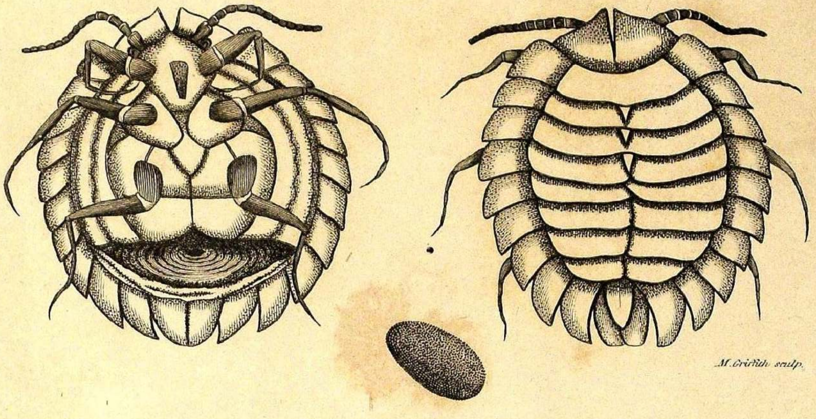
When the female Cochineel-Insect is arrived at its full size, it fixes itself to the surface of the leaf, and envelops itself in a white cottony matter, which it is supposed to spin or draw through its proboscis in a continued double filament, it being observed that two filaments are frequently seen

proceeding from the tip of the proboscis in the full-grown insect.

The Male is a small and rather slender dipterous fly, about the size of a flea, with jointed antennæ and large white wings in proportion to the body, which is of a red colour, with two long filaments proceeding from the tail. It is an active and lively animal, and is dispersed in small numbers among the females, in the proportion, according to Mr. Ellis, in the Philosophical Transactions, of about one male to a hundred and fifty, or even two hundred females. When the female insect has discharged all its eggs, it becomes a mere husk, and dies; so that great care is taken to kill the insects before that time, to prevent the young from escaping, and thus disappointing the proprietor of the beautiful colour. The insects when picked or brushed off the plants, are said to be first killed either by the fumes of heated vinegar, or by smoke, and then dried, in which state they are imported into Europe; and it is said that the Spanish Government is annually more enriched by the profit of the Cochineel trade than by the produce of all its gold-mines.

It may perhaps be almost unnecessary to add, that, exclusive of the general or large scale in which Cochineel is used by the dyers, the fine colour so much esteemed in painting, and known by the name of Carmine, is no other than a preparation from the same substance, and is unquestionably the most beautiful of all the pictorial reds. It is also used, when properly mixed with

COCCUS.



M. Griffith sculp.

Coccus cataphractus magnified,
with an egg.

62

1805, Octr. 1 London, Published by G. Kearsley, Fleet Street.

hair-powder, powdered talc, &c. in that innocent cosmetic, so much used by the Ladies, and popularly known by the French term Rouge.

Coccus Ilicis or Kermes, (the Kermes of the Materia Medica) is a species adhering, in its advanced or pregnant state, to the shoots of the *Quercus coccifera,* (Ilex aculeata cocciglandifera. C. Bauh. pin.) under the form of smooth reddish-brown or blackish powdery grains or balls of the size of small peas. The tree or shrub grows plentifully in many parts of France, Spain, Greece, and the islands of the Archipelago. The Cocci are found adhering in groupes of five, six, or more together, or pretty near each other. They are gathered for the purposes of commerce by the country people.

Before the discovery of America the Coccus Ilicis or Kermes, as it was then termed, was the most valuable substance for dying scarlet, and was collected in great quantity for that purpose. According to the mildness or severity of the winter the harvest of the Kermes is said to be more or less plentiful; and it is no very uncommon thing to have two harvests in a year. Before dying, the berries are steeped in vinegar, to prevent the exclusion of the young animals by thus killing the parents. They are then spread or thrown on linen, and as long as they continue moist are turned twice or thrice a day, to prevent their heating, and are afterwards put up for sale.

Woolen cloth dyed with Kermes was called

scarlet in grain; the animal having been popularly considered as a grain: the colour is a durable, deep red, called ox-blood colour, much inferior to the brilliancy of Cochineel scarlet, but far more lasting, and less liable to stain. Monsr. Hellot, in his *Art de tiendre*, observes that the figured cloths to be seen in the old tapestries of Brussels and the other manufactures of Flanders, which have scarcely lost any thing of their liveliness by standing for two hundred years, were all dyed with this ingredient.

Coccus Polonicus. This may be considered as the Cochineel of the North; being found only in cold climates. It is sometimes collected for the use of dyers, but is greatly inferior as a colour to the American Cochineel. It is chiefly found on the roots of the plant called Scleranthus perennis, and is principally produced in Poland.

Coccus cataphractus. This very singular species was described several years ago in the fifth volume of the Naturalist's Miscellany, from a specimen communicated by the ingenious Mr. Dickson, Gardener to the British Museum, and well known for his assiduous researches into that difficult branch of Botany the class Cryptogamia. Mr. Dickson, soon after its discovery, requested me to examine its characters, and endeavour to ascertain its genus. I accordingly made a microscopic survey of the animal, and could not but conclude it to be a species of Coccus.

The natural size of the insect, (of which the

female alone appears at present to be known,) is that of the Coccinella tigrina, or small yellow-spotted Lady-Bird, and at first view has an appearance so little allied to the generality of the Cocci as to make it doubtful whether it really belongs to that tribe of insects. The whole animal, (except the eyes, legs, antennæ, and rostrum,) being coated, in the most curious manner, in a complete suit of milk-white armour, as if cased in ivory. The divisions or annuli of the back are eight in number, of which the three superior ones are each furnished with a small scutellum or appendicular piece, which is wanting in the others. The sides are surrounded by projecting laminæ, somewhat in the manner of tortoises or millepedes: the lower surface is composed of angular pieces, disposed nearly as in the former of the above-mentioned animals: the eyes, which are situated just below or on the under side of the antennæ, are bright, and somewhat elevated, not unlike those of a lobster: the colour of the projecting parts, viz. the legs, eyes, antennæ, and rostrum, is a fine bright ferruginous or reddish brown. On the lower part of the abdomen the armour, in the figure engraved on the annexed plate, is represented broken off, displaying the wrinkles of the skin, &c. on that part, as well as the remarkable contraction which takes place in consequence of the insect's having deposited part of its ova, many of which I perceived still remaining, on breaking this part of the shield: these eggs

were small in proportion to the animal, and of a brown colour. It is from the singular manner in which this insect is coated that I have given it the title of Coccus cataphractus or mailed Coccus. It is found among sphagnum and other mosses in boggy and turfy ground, and is most frequent in Scotland, Ireland, and the north of England, particularly in some parts of Cumberland. If it really belongs to the genus Coccus, it is much to be wished that by a diligent search the male may at length be discovered, in order that the history of so curious an insect may be rendered complete.

I must not omit to add that I suspect this insect to have been slightly described and rudely figured (apparently from a bad specimen) in the seventh volume of the works of Degeer, who, like myself, supposes it to be a species of Coccus. His specimen seems to have been considerably smaller than the British ones.

A very small species of this genus is often seen, in its fixed or torpid state, on the surface of different kinds of Apples, and particularly on the golden pippin. It is not more than the tenth of an inch in length, and is of a long oval shape, gradually decreasing to a point at one end. It contains thirty or forty oval white eggs enveloped in a silky matter. This species seems to be very nearly allied to one described by the ingenious Mr. Baker, in his work entitled "*Employment for the Microscope.*" p. 371. Mr. Baker describes the twigs of an Ash as thickly covered on one side

with very numerous small spots of the size of very small pins heads, and of nearly the same colour with the bark itself: each when opened was found to contain thirty or forty eggs. On placing this twig in the ground, in a favourable situation, where the sun shone freely on it, after a certain time prodigious swarms of extremely minute Cocci proceeded from the eggs contained in the respective tubercles. They were of a beautiful scarlet colour, and measured about the hundred and fourteenth part of an inch in length. Their general appearance was very much that of an Oniscus or Millepede, but with six legs, two short bristles at the tail, and antennæ of a strong appearance, resembling a pair of forceps, being each curved inwards and pointed. If the male of this animal, which even in its full-grown or fixed state, is not more than the twentieth of an inch in length, bears the usual proportional difference of size to the female with the rest of the genus, it must surely be one of the most minute of all winged insects*.

* Coccus conchiformis of Gmelin's Syst. Nat. (Reaumur t. 5. f. 7.) seems to be nearly allied to the former of the above-described minute species.

THRIPS. THRIPS.

Generic Character.

Rostrum obscurum.	*Snout* inconspicuous.
Antennæ longitudine thoracis.	*Antennæ* the length of thorax.
Corpus lineare. Abdomen sursum reflexile.	*Body* linear. Abdomen reflexile upwards.
Alæ quatuor, rectæ, dorso incumbentes, longitudinales, angustæ, subcruciatæ.	*Wings* four, strait, long, narrow, incumbent on the back, slightly crossed.

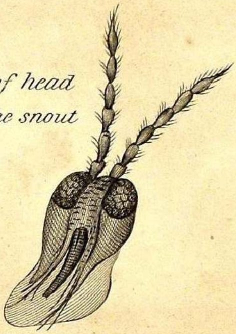
THIS is a genus consisting of very small insects, which are principally found on flowers. The antennæ are submoniliform, and of the length of the thorax: the snout is obscure or inconspicuous, short, and placed beneath the neck or head*: the body of a lengthened or sublinear shape, and the abdomen is at pleasure bent upwards or backwards: the wings are four in number, long, narrow, incumbent, and very slightly, or scarcely crossed over each other.

The most familiar example of the genus is the

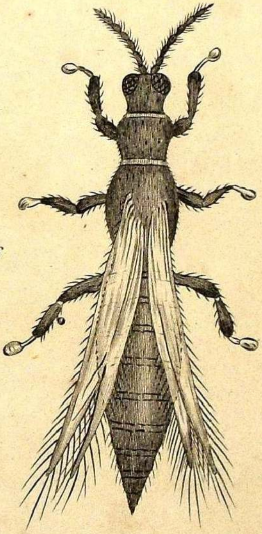
* It seems to have been most accurately described by Gleichen in his Microscopical Observations.

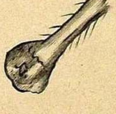
THRIPS.

Under view of head magnified to shew the snout



physapus





foot magnified

M.Griffith sculp.

1805 Oct 1 London Published by G Kearsley Fleet Street

Thrips physapus of Linnæus, which is a very small, slender insect, of a black colour, very frequently seen during the spring and summer on various flowers, more especially on what are termed the compound flowers, as Dandelion, &c. It wanders about the petals of the flower, descending to the bottom of the florets, occasionally emerging at intervals, and often skipping from place to place, in performing which action it is observed suddenly to turn back its abdomen, so as nearly to touch the thorax with its tip. The wings are of a semi-transparent white, narrow, and when properly magnified, are observed to be edged and tipped with hairs growing gradually longer as they approach the tips, where they are of considerable length: the lower wings are rather shorter than the upper, beneath which they are, in general, almost concealed: the antennæ consist of six joints, and the feet are tipped with an expansile and apparently vesicular process, enabling the little animal to adhere at pleasure with the greater security to any particular substance. All these particulars require a microscope for their investigation, the whole insect not exceeding the tenth of an inch in length. The larva in a great degree resembles the complete insect, but is destitute of wings: when very young it is white, and afterwards of a yellowish or reddish colour, and like the complete insect, is seen wandering about the petals of flowers.

The Thrips physapus has been supposed to do much injury to wheat, rye, &c. by causing the

young flowers to decay; thus preventing the growth of the embryo grain. This opinion however has by some been considered as erroneous, who have contended that the Thrips does not attach itself to such of the Cerealia as are in a perfectly healthy state, but rather to such as are diseased by having the germina covered with the dust of a very minute fungus, often growing on wheat, &c. and belonging to the genus Æcidium or Lycoperdon, and which makes its appearance in the form of a flattish, smooth, irregular exsudation of a yellow colour on various parts of the plant*. The ingenious Mr. Kirby however seems convinced that the Thrips is in reality an insect highly injurious to corn, by deriving its nourishment from the embryo grains.

* See much on this subject in the Transactions of the Linnæan Society, vols. 3, 4, and 5.

INSECTS.

ORDER

LEPIDOPTERA.

THIS splendid Order of Insects furnishes the most conspicuous example of the surprising difference in appearance between the larva or first state of the same animal and its complete or perfect state, in which it is capable of breeding.

The Lepidopterous Insects are divided into three genera, viz. *Papilio, Sphinx*, and *Phalæna*, or Butterfly, Sphinx, and Moth.

PAPILIO. BUTTERFLY.

Generic Character.

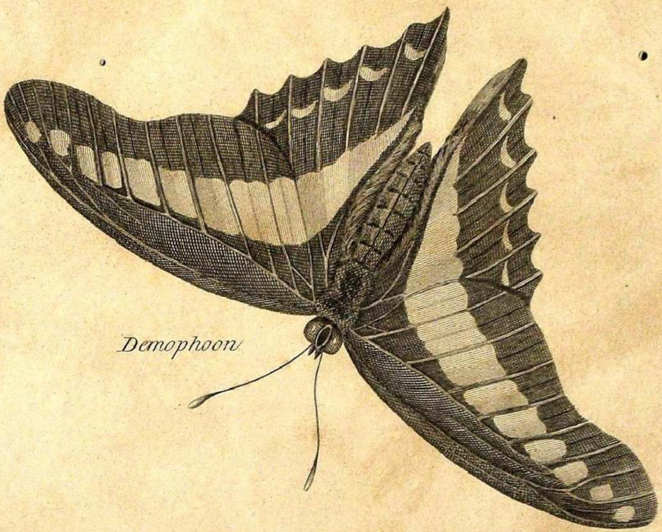
Antennæ apicem versus crassiores, sæpius clavato-capitatæ.	*Antennæ* thickening towards the extremity, commonly terminating in a knob or clavated tip.
Alæ (sedentis) erectæ sursumque conniventes, (volatu diurno.)	*Wings* (when sitting) erect and meeting upwards: (flight diurnal.)

THE prodigious number of species in this genus makes it absolutely necessary to divide the whole into sections or sets, instituted from the habit or general appearance, and, in some degree, from the distribution of the colour on the wings. This division of the genus is conducted by Linnæus in a peculiarly elegant and instructive manner, being an attempt to combine, in some degree, natural and civil history, by attaching the memory of some illustrious ancient name to an insect of such or such a particular cast.

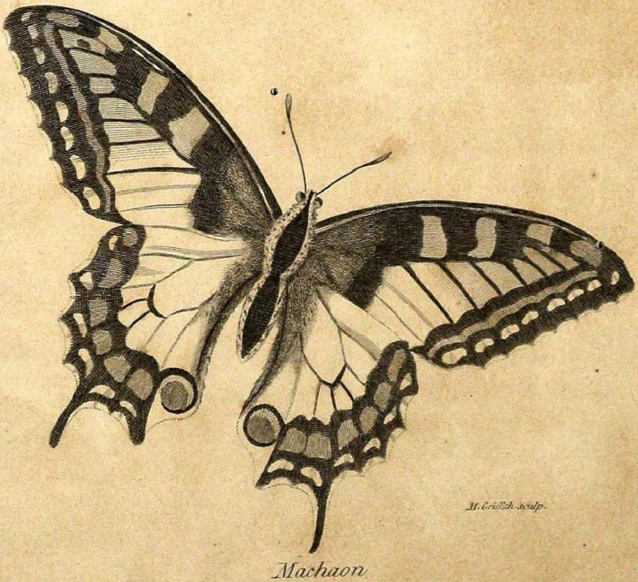
The first Linnæan division consists of the *Equites*, distinguished by the shape of their upper wings, which are longer, if measured from their hinder angle to their anterior extremity, than

PAPILIO.

EQU. TR.



Demophoon



M. Griffith sculp.

Machaon

EQU. ACHIV.

from the same point to the base. Some of this division have filiform or sharpened antennæ*, in which particular they resemble Moths, but may generally be very clearly distinguished by their habit or general shape. The Equites are either *Troes* or Trojans, distinguished by having red or blood-coloured spots or patches on each side their breasts, or *Achivi*, Greeks, without red marks on the breast, of gayer colours in general than the former, and often having an eye-shaped spot at the inner corner of the lower wings.

The next division consists of the *Heliconii*. These are distinguished by the narrowness of their wings, which are also, in general, of a more transparent appearance than in the other divisions; their upper wings are also generally much more oblong than the lower, which are short in proportion.

The third division consists of the *Danai*, (from the sons and daughters of Danaus.) They are divided into *Danai Candidi*, or those in which the ground-colour of the wings is generally white, and the *Danai Festivi*, in which the ground-colour is never white, and in which a greater variety of colour occurs than in the Candidi. The wings of the Danai are of a somewhat rounder shape than those of the Heliconii, or less stretched out.

The fourth section consists of the *Nymphales*,

* This part of the generic character is to be received with some limitation, since in the tribe *Equites* the antennæ are slender at the tip itself, though thickened a little before that part.

and is distinguished by the edges of the wings being scolloped or indented: it is subdivided into the *Nymphales gemmati*, in which eye-shaped spots are seen either on all the wings, or on the upper or lower pair only, and into the *Nymphales phalerati*, in which no ocellated spots are visible on the wings, but, in general, a great variety of colours.

The fifth section contains the *Plebeii*. These are, in general, smaller than the preceding kinds of Butterflies, and are subdivided into *Plebeii urbicolæ*, or those in which the wings are marked by semi-transparent spots, and *Plebeii rurales*, in which the spots or patches have no transparency.

The above distribution of the genus Papilio is not entirely accurate, and must therefore be received with a proper degree of allowance for a task so seemingly trifling, yet so really difficult. It has been observed by some critics that the blood-coloured spots, mentioned by Linnæus as characteristic of the *Trojans*, are not always found; and that the interior angle of the wings in the *Achivi* is not always marked with an eye-shaped spot: that the surest method therefore is, to consider such of the Equites as are of dark or mourning colours as belonging to the *Troes*, and those of gayer or livelier ones to the *Achivi*. It is added, that the under wings in some of the *Heliconii* are slightly indented, and might perhaps as well have been referred to the *Nymphales phalerati*; that the under wings of the *Danai festivi* are also often indented; and lastly, that the family of the *Plebeii* is particularly inaccurate, many of those insects

having characters which would more properly entitle them to a place in some of the other divisions.

The larvæ of Butterflies are universally and emphatically known by the name of Caterpillars, and are extremely various in their forms and colours, some being smooth, others beset with either simple or ramified spines, &c. and some, especially those belonging to the division Equites, are observed to protrude from their front, when disturbed, a pair of short tentacula or feelers, somewhat analogous to those of a snail.

A Caterpillar, when grown to its full size, retires to some convenient spot, and securing itself properly by a small quantity of silken filaments, either suspends itself by the tail, hanging with its head downwards, or else in an upright position, with the body fastened round the middle by a proper number of filaments. It then casts off the caterpillar skin, and commences chrysalis, in which state it continues till the inclosed Butterfly is ready for birth, which, liberating itself from the skin of the chrysalis, remains till its wings, which are at first very short, weak, and covered with moisture, are fully extended: this happens in the space of about a quarter of an hour, when the animal suddenly quits the state of inactivity to which it had been so long confined, and becomes at pleasure an inhabitant of air.

The papilionaceous insects in general, soon after their enlargement from the chrysalis, and commonly during their first flight, discharge some

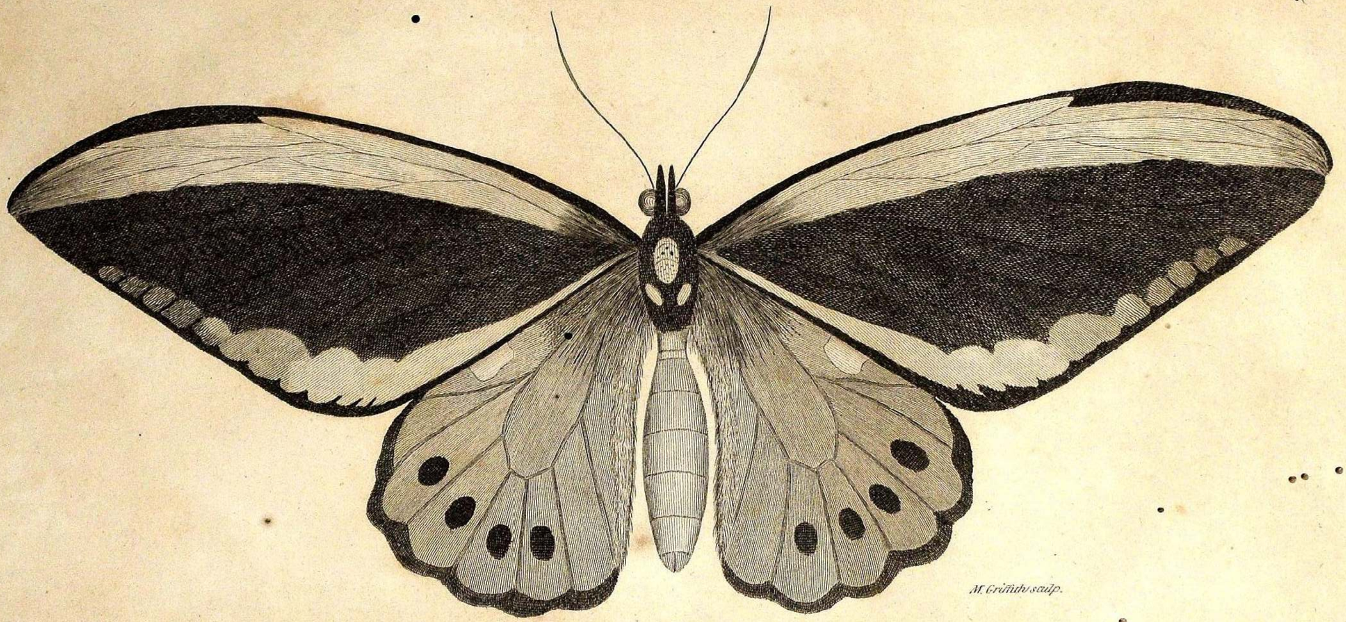
drops of a red-coloured fluid, more or less intense in different species. This circumstance, exclusive of its analogy to the same process of Nature in other animals, is peculiarly worthy of attention from the explanation which it affords of a phenomenon sometimes considered, both in ancient and modern times, in the light of a prodigy; viz. the descent of red drops from the air; which has been called a shower of blood: an event recorded by several writers, and particularly by Ovid, among the prodigies which took place after the death of the great dictator.

> "Sæpe faces visæ mediis ardere sub astris,
> Sæpe inter nimbos guttæ cecidere cruentæ."

> With threatening signs the lowering skies were fill'd,
> And sanguine drops from murky clouds distill'd.

This highly rational elucidation of a phenomenon at first view so inexplicable, seems to have been first given by the celebrated Peiresc, who with his own eyes observed the vestiges of an appearance of this kind in France in the year 1608, and was clearly convinced of its real origin, viz. the discharge above-mentioned from a species of Butterfly, (perhaps the P. urticæ, or P. polychloros,) which happened during that season to be uncommonly plentiful in the particular district where the phænomenon was observed. The same idea was also entertained by Swammerdam, though he does not appear to have verified it from his own observation.

PAPILIO.



M. Griffith sculp.

Priamus

1805, Octr. 1 London, Published by G. Kearsley, Fleet Street.

I shall now proceed to give a few examples of species belonging to each division of the genus Papilio.

Among the *Equites Troes* the Papilio *Priamus* should take the lead, not only from the corresponding dignity of the name, but from the exquisite appearance of the animal itself, which Linnæus considered as the most beautiful of the whole papilionaceous tribe. "Papilionum omnium princeps, longe augustissimus, totus holosericus, ut dubitem pulchrius quidquam, a Natura in insectis productum."

This admirable species measures more than six inches from wings end to wings end: the upper wings are velvet black, with a broad band of the most beautiful grass-green and of a satiny lustre drawn from the shoulder to the tip, and another on the lower part of the wing, following the shape of that part, and of a somewhat undulating appearance as it approaches the tip: the lower wings are of the same green colour, edged with velvet-black, and marked by four spots of that colour, while at the upper part of each, or at the part where the upper-wings lap over, is a squarish orange-coloured spot: the thorax is black with sprinklings of lucid green in the middle, and the abdomen is of a bright yellow or gold-colour. On the under side of the animal the distribution of colours is somewhat different, the green being disposed in central patches on the upper wings, and the lower being marked by more numerous black as well as orange spots. The red or bloody spots on each side the

thorax are not always to be seen on this the Trojan Monarch. The Papilio Priamus is a very rare insect, and is a native of the island of Amboyna.

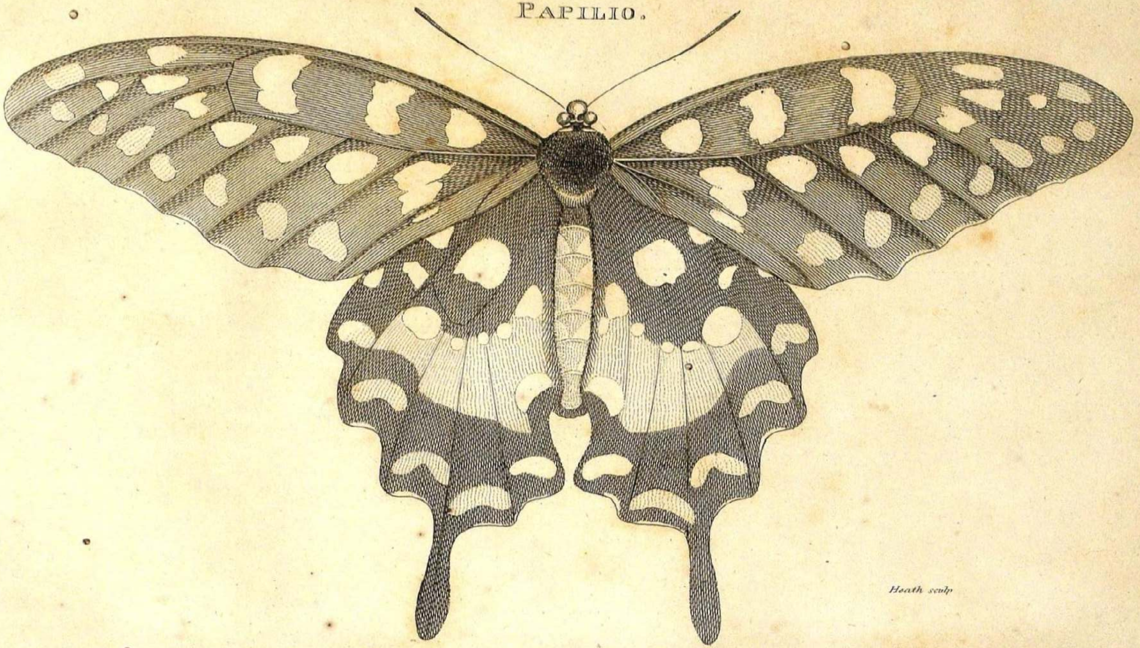
P. Antenor is a very large species, measuring six inches and a half in extent of wings: its colour is black, with numerous cream-coloured spots and patches, and the under-wings, which are tailed or furnished with a pair of lengthened processes in the middle, are edged with a row of red crescent-shaped spots. It is said to be a native of India.

P. Hector is very happily named, being of a deep or velvet black colour, with the lower wings marked by numerous blood-red spots: the thorax is red on each side, and the upper wings have a pair of obscure, broken, whitish, transverse clouds or bars. It is a native of the East Indies.

P. Sarpedon is a highly elegant species: the wings are of a lengthened shape, and the lower pair are stretched downwards into a pointed process: the whole animal is black, with a broad, interrupted pea-green stripe or band passing through all the wings: on the lower part is also a border of crescent-shaped green spots.

Among the *Equites Achivi* the *P. Menelaus* may be considered as one of the most splendidly beautiful of the Butterfly tribe. Its size is large, measuring, when expanded, about six inches; and its colour is the most brilliant silver-blue that imagination can conceive, changing, according to the variation of the light, into a deeper blue, and in some lights to a greenish cast: on the under side it is entirely brown, with numerous deeper and

PAPILIO.



Heath sculp

Antenor

1805, Oct.r 1 London, Published by G. Kearsley, Fleet Street

lighter undulations, and three large ocellated spots on each wing. It is a native of South-America, and proceeds, according to Madam Merian, who has figured it in her work on the Surinam Insects, from a large yellow caterpillar, beset with numerous, upright, sharp, black spines. It changes into an angular chrysalis, of a brown colour, and distinguished by having the proboscis projecting in a semicircular manner over the breast: from this chrysalis, in about fourteen days, proceeds the complete insect.

The *P. Machaon* is an insect of great beauty, and may be considered as the only British species of Papilio belonging to the tribe of *Equites**. It is commonly known among the English collectors by the title of the Swallow-Tailed Butterfly, and is of a beautiful yellow, with black spots or patches along the upper edge of the superior wings: all the wings are bordered with a deep edging of black, decorated by a double row of crescent-shaped spots, of which the upper row is blue, and the lower yellow: the under wings are tailed, and are marked at the inner angle or tip with a round red spot bordered with blue and black. The caterpillar of this species feeds principally on fennel and other umbelliferous plants, and is sometimes found on rue. It is of a green colour, encircled with numerous black bands spotted with red, and is furnished on the top of

* Unless we admit the Papilio Podalirius to be a British species also.

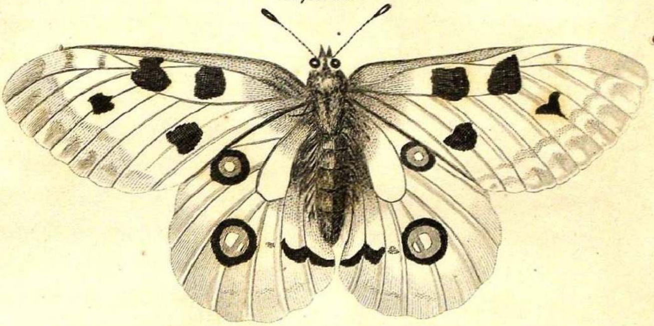
the head with a pair of short tentacula of a red colour, which it occasionally protrudes from that part. In the month of July it changes into a yellowish-grey angular chrysalis, affixed to some convenient part of the plant, or other neighbouring substance, and from this chrysalis in the month of August proceeds the complete insect. It sometimes happens that two broods of this butterfly are produced in the same summer, viz. the first in May, having lain all winter in the chrysalis state, and the second in August, from the chrysalides of July.

Of the division called *Heliconii* the beautiful insect the *Papilio Apollo* is an example. It is a native of many parts of Europe, but has not yet been observed in our own country, and is somewhat larger than the common great cabbage-butterfly; of a white colour, with a slight semi-transparency towards the tips of the wings, which are decorated with velvet-black spots, and on each of the lower wings are two most beautiful ocellated spots consisting of a carmine-coloured circle with a white centre and black exterior border. The caterpillar is black, with small red spots, and a pair of short retractile tentacula in front: it feeds on Orpine and some other succulent plants, and changes into a brown chrysalis, covered with a kind of glaucous or violet-coloured powder.

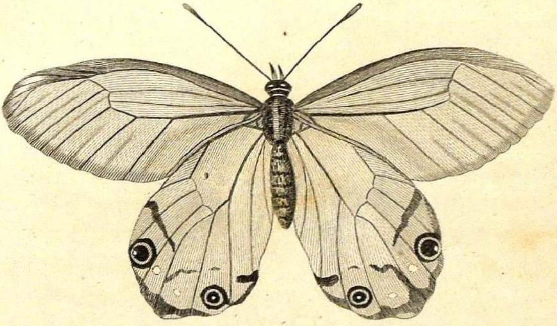
P. Piera has semitransparent wings, with the lower pair marked by two ocellated black spots with a yellow ring and centre. It is a native of South-America.

HELICONII

Apollo



Piera



M. Griffith sculp.

Polyhymnia

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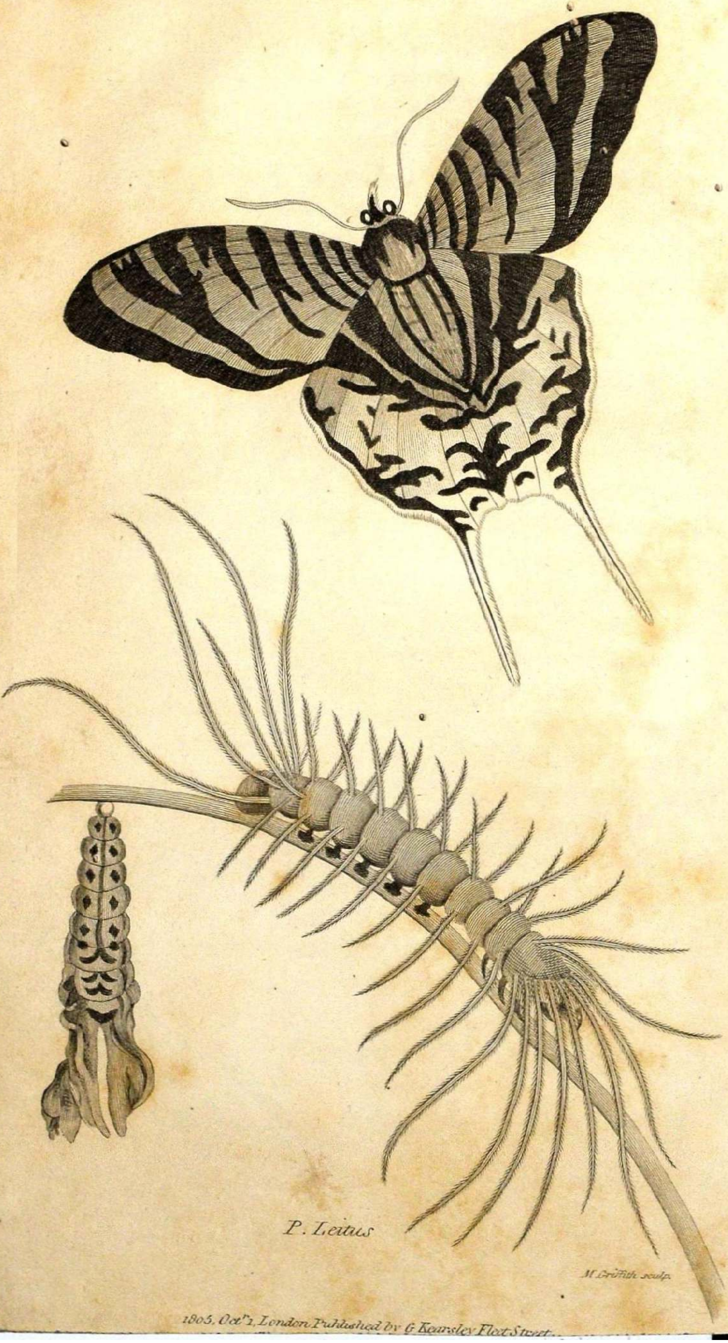

P. Leilus

M. Griffith sculp.

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P. Cratægi or the Hawthorn Butterfly is nearly of the size of the common cabbage butterfly, and is of a white colour, with black fibres on the wings, and is seen in the months of June and July.

Of the longer winged *Heliconii* the *P. Ricini* is a good example: it is black, with two yellowish, obliquely-transverse bands on the upper wings, while the lower are deeply bordered with black. It is a native of South-America.

Of the division entitled *Danai Candidi* the common large white Butterfly, or *P. Brassicæ* is a familiar example: this insect is too well known to require particular description, and it may be only necessary to remind the reader that it proceeds from a yellowish caterpillar freckled with blueish and black spots, and which changes during the autumn into a yellowish grey chrysalis, affixed in a perpendicular direction to some wall, tree, or other object, some filaments being drawn across the thorax in order the more conveniently to secure its position. The fly appears in May and June, and is seen through all the summer.

The term *Candidi* in this division, being applied only in a general sense, it of course contains some species of a different colour: among these one of the most elegant is the *P. Rhamni* or Buckthorn Butterfly, of a bright sulphur-colour, with sharp-cornered wings marked by a small orange spot in the middle of each. It is not uncommon during spring and autumn.

P. Hyale or the Fern Butterfly is also in this

division, and is a beautiful species with orange-yellow wings deeply bordered with black.

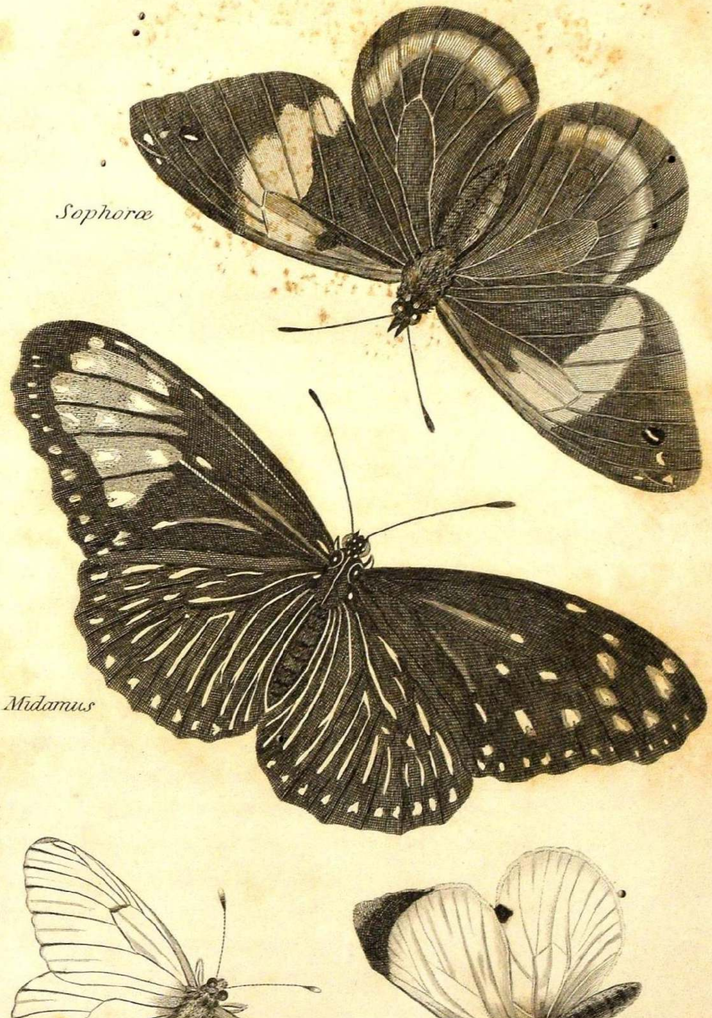
Of the *Danai Festivi* the *P. Midamus* may serve as an example; an elegant Asiatic species, of a black colour, with a varying blue lustre towards the tips of the upper wings, which are marked by many white spots, while the lower pair are streaked longitudinally with numerous white lines, and edged with a row of white specks.

P. Sophoræ is also of this tribe: it is of a fine brown colour, with a bright orange-ferruginous bar across the upper wings, and a more obscure one of similar colour round the lower part of the under wings: it is a native of South-America, and according to Madam Merian, proceeds from a large rufous caterpillar marked above by narrow longitudinal white stripes.

Among the *Nymphales Gemmati* few can exceed in elegance the *P. Io* or Peacock Butterfly, a species by no means uncommon in our own country: the ground-colour of this insect is orange-brown, with black bars separated by yellow intermediate spaces on the upper edge of the superior wings, while at the tip of each is a most beautiful large eye-shaped spot, formed by a combination of black, brown, and blue, with the addition of whitish specks: on each of the lower wings is a still larger eye-shaped spot, consisting of a black central patch, varied with blue, and surrounded by a zone of pale brown, which is itself deeply bordered with black: all the wings are scolloped or denticulated. The caterpillar is

PAPILIO.

DANAI FESTIVI

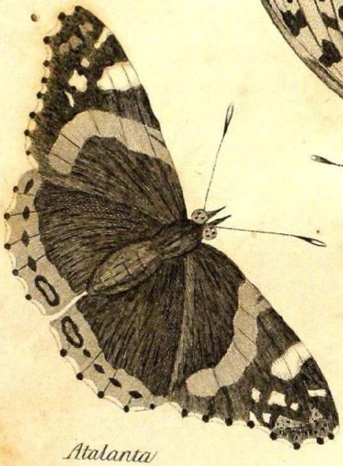


DANAI CANDIDI.

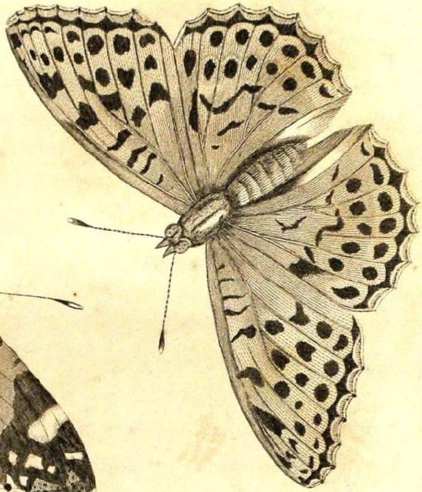
M. Griffith sculp.

1805, Octr. 1 Published by G. Kearsley, Fleet Street.

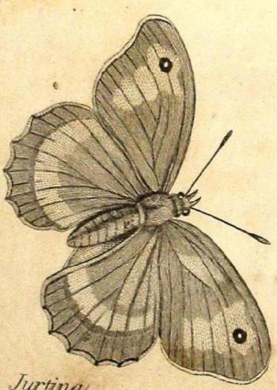
NYMPHALES PHALERATI.



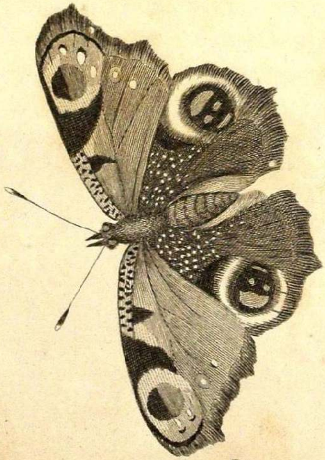
Atalanta



Paphia



Jurtina



Iö

M. Griffiths sculp.

NYMPHALES GEMMATI.

1803, Oct. 1 London. Published by G. Kearsley, Fleet Street.

black, with numerous white spots, and black ramified spines: it feeds principally on the Nettle, changing to chrysalis in July, and the fly appearing in August.

P. Jurtina is a species equally common, though far less beautiful. It is chiefly observed in meadows, and is of a brown colour, the upper wings having a much brighter or orange-ferruginous bar towards the tips, with a small, black, eye-shaped spot with a white centre: on the opposite or under side of the insect the same distribution of colours takes place.

Of the *Nymphales Phalerati* few can surpass the common English species called *P. Atalanta* or the Admirable Butterfly: it is of the most intense velvet-black colour, with a rich carmine-coloured bar across the upper wings, which are spotted towards the tips with white; while the lower wings are black, with a deep border of carmine-colour marked by a row of small black spots: the under surface of the wings also presents a most beautiful mixture of colours: the caterpillar is brown and spiny, feeds on Nettles, and changes into a chrysalis in July, the Fly appearing in August.

P. Paphia is a highly elegant insect, of a fine orange-chesnut colour above, with numerous black spots and bars: beneath greenish, with narrow silvery undulations on the lower wings and black spots on the upper. It proceeds from a yellowish brown spiny caterpillar, living principally on nettles. This insect is generally found in the neighbourhood of woods.

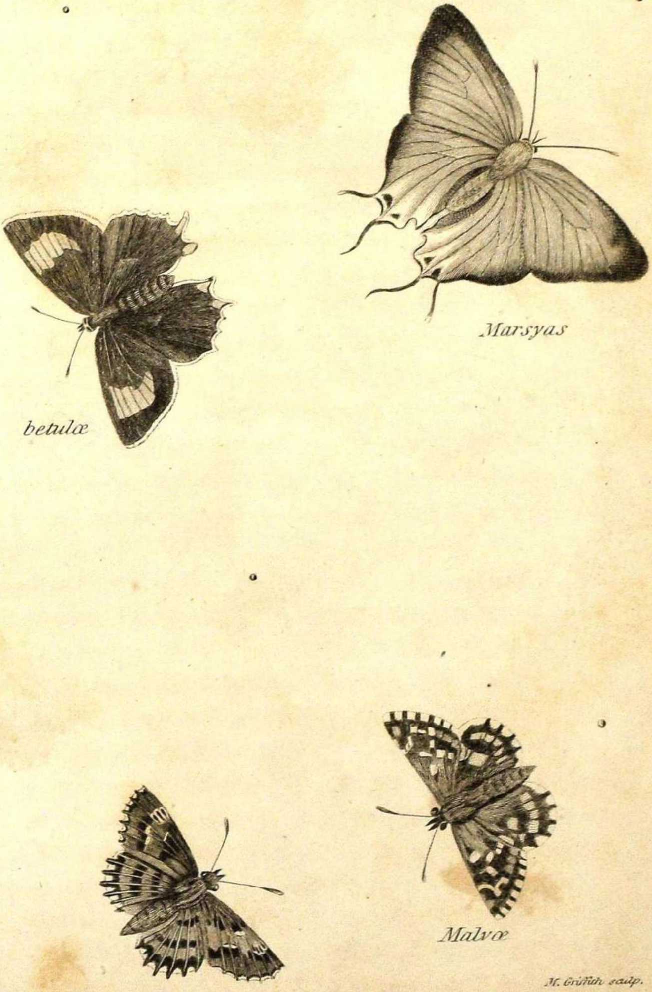
Of the last division, termed *Plebeii*, may be adduced as an example a small English Butterfly called *P. Malvæ*, of a blackish or brown colour, with numerous whitish and semitransparent spots. It belongs to the *Plebeii Urbicolæ*.

The *P. Betulæ* is also seen in woods, and is a small species, of a blackish-brown colour, with a broad orange bar on the upper wings, the lower pair being slightly produced into two orange-coloured tails or processes towards the inner corner. This species belongs to the *Plebeii Rurales*.

To this latter division also belongs a very beautiful exotic species, a native of India, and of a most exquisite lucid blue colour, edged with black, and farther ornamented by having each of the lower wings tipped with two narrow black tail-shaped processes. It is the *P. Marsyas* of Linnæus.

PAPILIO.

PLEBEII RURALES.



M. Griffith sculp.

PLEBEII URBICOLÆ

1805, Oct.r 1.st London, Published by G. Kearsley, Fleet Street.

SPHINX. SPHINX.

Generic Character.

Antennæ medio crassiores, seu utraque extremitate attenuatæ, subprismaticæ.	*Antennæ* thickest in the middle, subprismatic, and attenuated at each extremity.
Alæ deflexæ (volatu graviore vespertino seu matutino.)	*Wings* deflected. (Flight strong, and commonly in the evening or morning.)

THE Insects of this genus are sometimes called by the title of Hawk-Moths, and have in general a large thorax and thick body, commonly tapering towards the extremity. The flight of the larger kinds is chiefly confined to the evening or early morning hours, few species appearing on the wing in the middle of the day. The name Sphinx is applied to the genus on account of the posture assumed by the larvæ of several of the larger species, which are often seen in an attitude much resembling that of the Egyptian Sphinx, viz. with the fore-parts elevated, and the rest of the body applied flat to the surface.

One of the most elegant insects of this genus is the *Sphinx Ligustri* or Privet Hawk-Moth. It is a large insect, measuring nearly four inches and a

half from wings end to wings end: the upper wings are of a brown colour, most elegantly varied or shaded with deeper and lighter streaks and patches; the under wings and body are of a fine rose-colour, barred with transverse black stripes. The caterpillar, which is very large, is smooth, and of a fine green, with seven oblique purple and white stripes along each side: at the extremity of the body, or top of the last joint, is a horn or process pointing backwards. This beautiful caterpillar is often found in the months of July and August feeding on the Privet, the Lilac, the Poplar, and some other trees, and generally changes to a chrysalis in August or September, retiring for that purpose to a considerable depth beneath the surface of the ground, and, after casting its skin, continuing during the whole winter in a dormant state, the Sphinx emerging from it in the succeeding June.

Sphinx Ocellata is perhaps still more beautiful: it is a rather smaller insect than the preceding, and has the upper wings and body brown, the former finely clouded with different shades, while the lower wings are of a bright rose-colour, each marked with a large ocellated black spot with a blue interior circle and a black centre. This insect proceeds from a green caterpillar of a rough or shagreen-like surface, marked on each side by seven oblique yellowish-white streaks, and furnished, like the preceding, with a horn at the tail. It is principally found on the Willow; retires under ground, in order to undergo its change

M. Griffiths sculp.

Sph. ocellata.

1805, Oct.r 1 London. Published by G. Kearsley Fleet Street.

SPHINX.

S. Atropos.

M. Griffiths sculp.

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SPHINX.

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M. Griffith sculp.

S. Convolvuli.

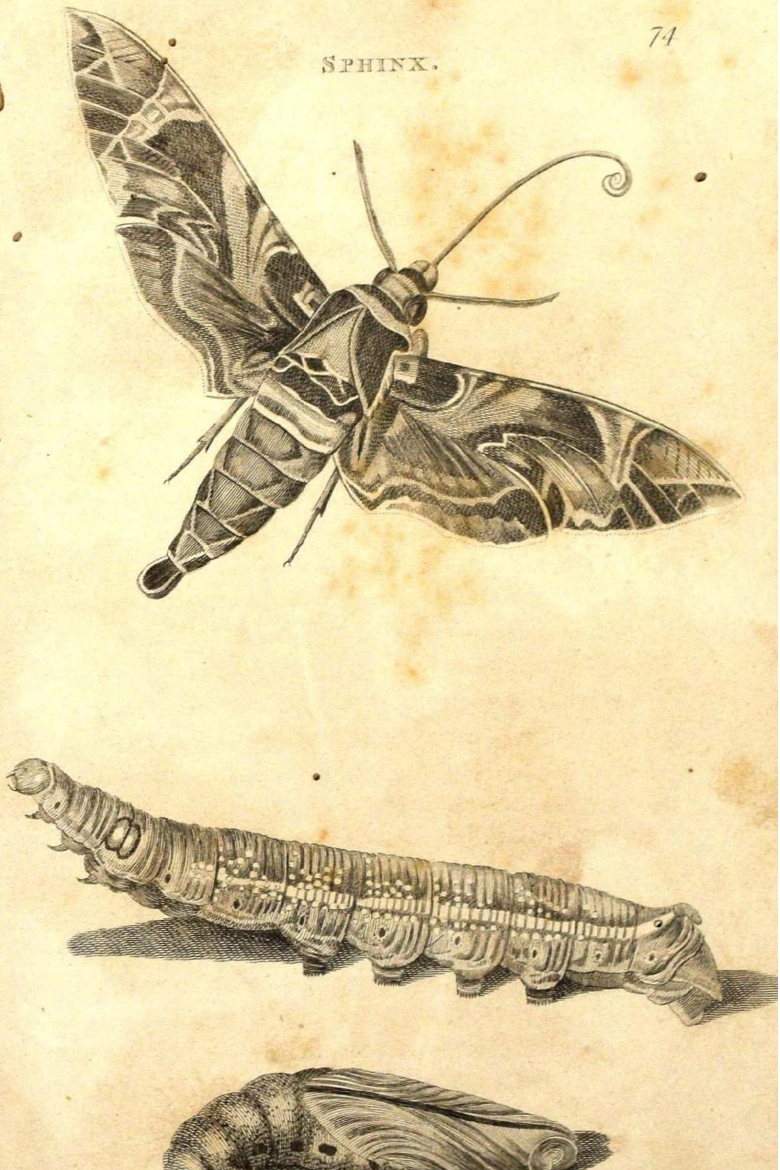
1805, Oct.r 1 Published by G Kearsley, Fleet Street.

into the chrysalis state, in the month of August or September, and in the following June appears the complete insect.

But the largest and most remarkable, if not the most beautiful European insect of this genus, is the *Sphinx Atropos* of Linnæus, which very considerably exceeds in size both the species already mentioned. The upper wings are of a fine dark grey colour, with a few slight variegations of dull orange and white: the under wings are of a bright orange-colour, marked by a pair of transverse black bands: the body is also orange-coloured, with the sides marked by black bars, while along the top of the back, from the thorax to the tail, runs a broad blue-grey stripe: on the top of the thorax is a very large patch of a most singular appearance, exactly representing the usual figure of a skull or death's head, and is of a pale grey, varied with dull ochre-colour and black. When in the least disturbed or irritated, this insect emits a stridulous sound, something like the squeaking of a bat or mouse, and from this circumstance, as well as from the mark above-mentioned on the thorax, is held in much dread by the vulgar in several parts of Europe, its appearance being regarded as a kind of ill omen, or harbinger of approaching fate. We are informed by the celebrated Reaumur that the members of a female Convent in France were thrown into great consternation at the appearance of one of these insects, which happened to fly in during the evening at one of the windows of the dormitory. The

caterpillar from which this curious Sphinx proceeds is in the highest degree beautiful, and far surpasses in size every other European insect of the kind, measuring sometimes near five inches in length, and being of a very considerable thickness: its colour is a bright yellow, the sides marked by a row of seven most elegant broad stripes or bands, of a mixed violet and sky-blue colour: the tops of these bands meet on the back in so many angles, and are varied on that part with jet-black specks: on the last joint of the body is a horn or process, not in an erect position, as in the preceding kinds, but hanging or curving over the joint in the manner of a tail, having a rough or muricated surface and a yellow colour. This caterpillar is principally found on the potatoe and the jessamine, those plants being its favorite food. It usually changes into a chrysalis in the month of September, retiring for that purpose pretty deep under the surface of the earth; the complete insect emerging in the following June or July; but some individuals are observed to change into chrysalis in July or August; and these produce the complete insect in November; so that there appear to be two broods or annual races. The Sphinx Atropos is generally considered as a very rare insect, and as the caterpillar feeds chiefly by night, concealing itself during the day under leaves, &c. it is not often detected: yet, from some singular circumstances favourable to its breed, there are some seasons in which it is even plentiful, as in the autumn of the present year

SPHINX.



Heath sculp

S. Nerii.

1805 Oct.r 1 London Published by G Kearsley Fleet Street

1804, in which the caterpillar was so common in some counties as to be very prejudicial to the potatoe-plants, particularly in some parts of Cornwall, Surry, &c.

The alteration of form which the whole of the papilionaceous tribe undergo, and in a particular manner the changes above-described of the genus Sphinx, afford a subject of the most pleasing contemplation to the mind of the naturalist, and though a deeply philosophical survey demonstrates that there is no real or absolute change produced in the identity of the creature itself, or that it is in reality no other than the gradual and progressive evolution of parts before concealed, and which lay masqued under the form of an insect of a widely different appearance, yet it is justly viewed with the highest admiration, and even generally acknowledged as in the most lively manner typical of the last eventful change.

If any regard is to be paid to a similarity of names, it should seem that the ancients were sufficiently struck with the transformations of the Butterfly, and its revival from a seeming temporary death, as to have considered it as an emblem of the soul; the Greek word ψυχη signifying both the soul and a butterfly. This is also confirmed by their allegorical sculptures, in which the butterfly occurs as an emblem of immortality.

Modern naturalists, impressed with the same idea, and laudably solicitous to apply it as an illustration of the awful mystery revealed in the sacred writings, have drawn their allusions to it

from the dormant condition of the papilionaceous insects during their state of chrysalis, and their resuscitation from it; but they have, in general, unfortunately chosen a species the least proper for the purpose; viz. the Silkworm, an animal which neither undergoes its changes under the surface of the earth, nor, when emerged from its tomb, is it an insect of any remarkable beauty; but the larva or caterpillar of the Sphinx, when satiate of the food allotted to it during that state, retires to a very considerable depth beneath the surface of the ground, where it divests itself of all appearance of its former state, and continues buried during several months; then rises to the surface, and bursting from the confinement of its tomb, commences a being of powers so comparatively exalted, and of beauty so superior as not to be beheld without the highest admiration. Even the animated illustration taken from the vegetable world, so justly admired, as best calculated for general apprehension, must yield in the force of its similitude to that drawn from the insect's life, since Nature exhibits few phenomena that can equal so wonderful a transformation.

I must here request the reader's permission to repeat on this subject some lines long ago introduced into the pages of the Naturalist's Miscellany.

The helpless crawling caterpillar trace
From the first period of his reptile race.
Cloth'd in dishonour, on the leafy spray
Unseen he wears his silent hours away.

Till satiate grown of all that life supplies,
Self-taught the voluntary martyr dies.
Deep under earth his darkling course he bends,
And to the tomb, a willing guest, descends.
There, long secluded in his lonely cell,
Forgets the sun, and bids the world farewel.
O'er the wide waste the wintry tempests reign,
And driving snows usurp the frozen plain.
In vain the tempest beats, the whirlwind blows;
No storms can violate his grave's repose.
But when revolving months have won their way,
When smile the woods, and when the zephyrs play,
When laughs the vivid world in summer's bloom,
He bursts and flies triumphant from the tomb,
And, while his new-born beauties he displays,
With conscious joy his alter'd form surveys.
Mark, while he moves amid the sunny beam,
O'er his soft wings the varying lustre gleam.
Launch'd into air, on purple plumes he soars,
Gay Nature's face with wanton glance explores;
Proud of his various beauties wings his way,
And spoils the fairest flowers, himself more fair than they!
And deems weak Man the future promise vain,
When worms can die, and glorious rise again? G. S.

I must not conclude the survey of the genus Sphinx without observing that it contains some species of a smaller size and of a somewhat different habit from the kinds above described. Among these is the beautiful *Sphinx Fillipendulæ* or Dropwort Sphinx, common in meadows towards the decline of summer, and which is distinguished by having the upper wings of an oblong-oval shape and of a dark shining green colour, with blood-red spots, and the lower wings red with a dark green edging: the caterpillar is of a pale yellow,

with rows of squarish black spots, and is often seen feeding on various meadow plants and grasses: it does not undergo its change under ground, but encloses itself in an oval shining yellow web of silk, attached to the stem of some grass, &c. In this it changes into a chrysalis, out of which in about the space of three weeks emerges the complete insect.

Others of the smaller Sphinges are remarkable for having the wings in a considerable degree transparent: of this kind is the *Sphinx apiformis*, which is of an aspect at first sight more resembling that of a wasp or hornet than of a Sphinx, the wings being transparent with merely a slight edging of brown, and the thorax and abdomen varied with black and yellow. The caterpillar inhabits the hollows of Poplar, Sallow, Willow, and Lime trees, feeding on the substance of the bark; changing to a chrysalis in April, and the Fly appearing in the month of June.

Sphinx crabroniformis is so much like the former as scarcely to be distinguished from it, and inhabits the hollows of the Sallow and other Willows, feeding on the wood: it changes to a chrysalis in May, and the Fly appears in July.

PHALÆNA. MOTH.

Generic Character.

Antennæ setaceæ, a basi ad apicem sensim attenuatæ.	*Antennæ* setaceous, gradually lessening from base to tip.
Alæ (sedentis) sæpius deflexæ, (volatu nocturno.)	*Wings* (when sitting) generally deflex, (flight nocturnal.)

THIS genus like that of Papilio, containing a vast number of species, is divided into assortments, according to the different habits of the animals. These assortments are as follows, viz.

Attaci, or those in which the wings, when at rest, are spred out horizontally.

Bombyces, in which the wings are incumbent, and the antennæ pectinated.

Noctuæ, with incumbent wings and setaceous antennæ.

Geometræ, with wings horizontally spread out, nearly as in the Attaci.

Tortrices, with very obtuse wings, curved on the exterior margin.

Pyralides, with wings converging into a deltoid and slightly furcated figure.

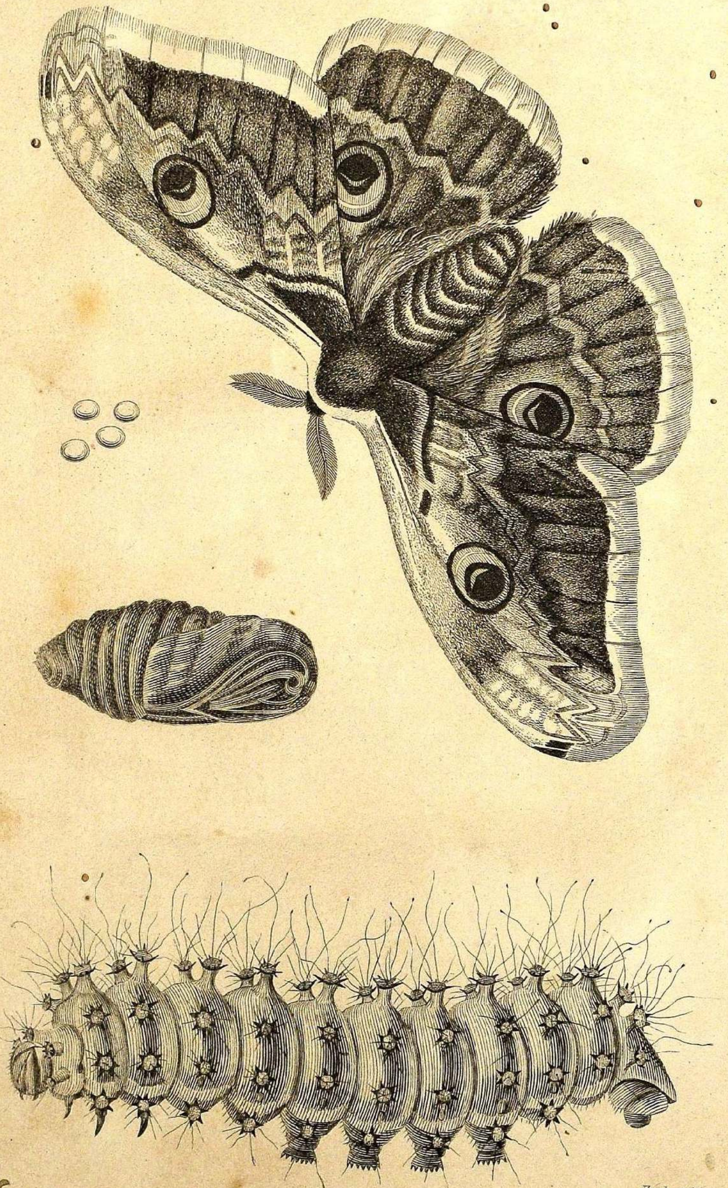
Tineæ, with wings convoluted into a cylinder.

Alucitæ, with wings divided into distinct plumes.

These distributions, like those of the genus Papilio, are not strictly accurate, and must therefore be regarded with a proper degree of allowance.

In the first division or Attaci ranks the most splendid, and largest of all the Phalænæ yet known, viz. the *Phalæna Atlas*, an insect so large that the extent of its wings measures not less than eight inches and a half: the ground-colour is a very fine deep orange-brown, and in the middle of each wing is a large subtriangular transparent spot or patch, resembling the appearance of a piece of Muscovy talc: each of these transparent parts is succeeded by a black border, and across all the wings run lighter and darker bars, exhibiting a very fine assortment of varying shades: the upper wings are slightly curved downwards at their tips in a falcated manner, and the lower wings are edged with a border of black spots on a pale buff-coloured ground: the antennæ are widely pectinated with a quadruple series of fibres, exhibiting a highly elegant appearance. This insect is a native of both the Indies, and occasionally varies both in size and colours.

Ph. Luna is an American species, of large size, and extremely beautiful: its colour is a most elegant pea-green, with a small yellowish eye-shaped spot with a transparent centre in the middle of each wing, and the lower wings are produced at the bottom into a long and broad tail or con-



Heath sculp.

Ph. Junonia.

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tinuation: the ridge of the upper wings is broad and of a fine purple-brown colour: the head and thorax yellowish white, and the body milk-white.

Of the European species of this division beyond comparison the finest is the *Phalæna Junonia* (Ph. pavonia Lin.) a native of many parts of Germany, Italy, France, &c. but not yet observed in England. It measures about six inches in extent of wings, and is varied by a most beautiful assortment of the most sober colours, consisting of different shades of deep and light grey, black, brown, &c. on the middle of each wing is an eye-shaped spot, having the disk black, shaded on one side with blue; surrounded with red-brown, and the whole included by a circle of black: lastly, all the wings are bordered by a deep edging of very pale brown, with a whiter line immediately adjoining to the darker part of the wing: the antennæ are finely pectinated. The caterpillar, which feeds on the apple, pear, &c. is hardly less beautiful than the insect itself: it is of a fine apple or yellowish-green colour with each segment of the body ornamented by a row of upright prominences of a bright-blue colour, with black radiated edges, and surrounded by long black filaments, each of which terminates in a clavated tip. This larva, when ready for its change, envelops itself in an oval web with a pointed extremity, and transforms itself into a large short chrysalis, out of which afterwards emerges the moth.

The *Phalæna pavonia* minor or smaller Peacock

Moth is a native of England, and is commonly called the Emperor Moth. In every respect except size it so greatly resembles the former, that Linnæus chose to consider it as a permanent variety only of the same species. The larva and pupa are also of the same appearance with those of the preceding, but on a much smaller scale.

The *Bombyces* constitute a very numerous tribe, of which the *Phalæna Caja* or great tiger-moth may serve as an example. This species is one of the larger English moths, and is of a fine pale cream colour, with chocolate-brown bars and spots; the lower wings red, with black spots; the thorax chocolate-brown, with a red collar round the neck, and the body red with black bars. The Caterpillar is of a deep brown, with white specks; extremely hairy, and feeds on various plants. It changes into chrysalis in June, and the Fly appears in July.

Ph. Vinula is remarkable for elegance of appearance without gaiety of colour, being a middle-sized white moth, variegated with numerous small black streaks and specks: the thorax and abdomen are extremely downy, and the body is marked by transverse black bars. The caterpillar of this moth is far more brilliant in its appearance than the complete animal; it is of considerable size, measuring above two inches in length, and is of a most beautiful green colour, with the back of a dull purple, freckled with very numerous deeper streaks in a longitudinal direction: this purple part of the back is separated from the green on the sides by

a pair of milk-white stripes, which commencing from the head, run upwards to the top of the back; that part being elevated considerably above the rest into a pointed process; and from thence are continued along the sides to the tail: the face is flat, and subtriangular, yellowish, surrounded first by a black, and then by a red border; and is distinguished by two deep-black eyes or spots on each side the upper part: from the tail, which is extended into two long, roughened, sharp-pointed, tubular processes, proceed, on the least irritation, two long, red, flexible tentacula, the animal seeming to exert them as if for the purpose of terrifying its disturbers; lifting up the fore-part of the body at the same time, in a menacing attitude, and presenting a highly grotesque appearance: it also possesses the power of suddenly ejecting from its mouth, to a considerable distance, an acrimonious reddish fluid, which it uses as a farther defence, and which produces considerable irritation if it happens to be thrown into the eyes of the spectator. This caterpillar is principally seen on Willows and Poplars, and when the time of its change arrives, descends to the lower part of the tree, and envelops itself in a glutinous case, prepared by moistening with its saliva the woody fibres of the tree, and covering itself with them, attaching the edges very closely to the bark: this case, having very much the colour of the bark itself, is not very conspicuous, so that the insect generally remains secure under its covering throughout the whole winter, it being too close to

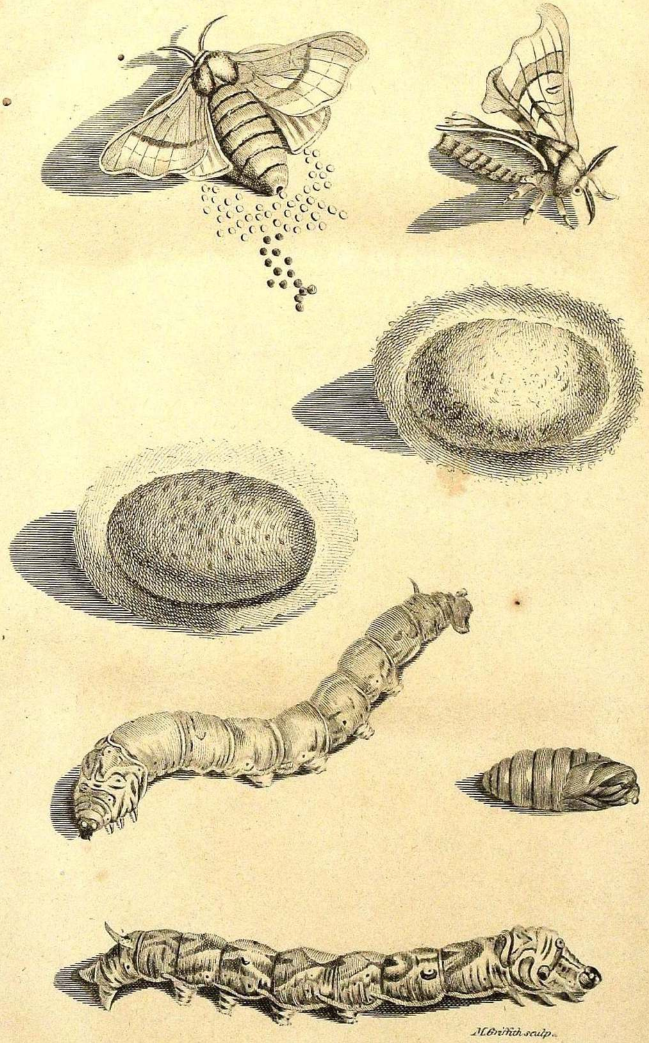
be penetrated by the frost, and too strong to be successfully attacked by birds, &c. it requires even a very sharp knife, assisted by a strong hand, to force it open. The chrysalis is thick, short, and black, and in the month of May or June, according to the warmth or coolness of the season, gives birth to the Moth, which, immediately on emerging from the upper part of the chrysalis, discharges a quantity of fluid sufficient to soften effectually the walls of its prison, and effect a ready escape. This moth, from its unusually downy appearance, has obtained the popular title of the Puss Moth.

Phalæna fuscicauda or the Brown-Tail Moth is remarkable for the ravages which its caterpillar commits, by destroying the foliage of trees and hedges, and reducing them to a perfectly bare appearance. The moth itself is about a third part less than that of a Silkworm, and is of a fine satiny white, except the hinder part of the body, which is of a deep brown. The caterpillar is brown, with ferruginous hairs, a row of white spots along each side, and two red spots on the lower part of the back: it is of a gregarious nature, vast numbers residing together under one common web: they are hatched early in autumn, from eggs laid by the parent moths*, and immediately form for themselves a small web, and begin feeding on the foliage of the tree or shrub on which they were placed: they marshal themselves with great regu-

* See Curtis's History of the Brown-Tail Moth. *Lond.* 1783, 4to.

larity for this purpose in rows, and at first devour only the upper pellicle and the green parenchyma of the leaves, and in the evening retire to their web. In about three weeks they cast their skin, and afterwards proceed to feed as before, enlarging their web from time to time, and forming it on all sides as strong and secure as possible. In this they remain the whole winter in a state of torpidity, till being enlivened by the warmth of the returning spring, they again issue from their covering, and being now grown stronger, begin to devour the whole substance of the leaves, instead of contenting themselves with the upper part as in their very young state. The destruction which they sometimes cause to the verdure of the country may be judged of by their ravages in the year 1782, when, according to the account of the ingenious Mr. Curtis, author of the Flora Londinensis, &c. in many parishes about London subscriptions were opened and the poor people employed to cut off and collect the webs at one shilling per bushel, which were burned, under the inspection of the church-wardens, overseers, or beadles of the respective parishes. At the first onset of this business Mr. Curtis assures us he was informed that fourscore bushels were collected in one day in the parish of Clapham alone. When these caterpillars are arrived at full growth, which is usually about the beginning of June, each spins itself a separate web, in which it changes to a dark-brown chrysalis, out of which in the beginning of July proceeds the Moth.

But of all the Moths of the tribe Bombyx the *Phalæna Mori* or Silkworm Moth is by far the most important. This is a whitish Moth, with a broad pale-brown bar across each of the upper wings. The caterpillar or larva, emphatically known by the title of the Silkworm, is, when full grown, nearly three inches long, and of a yellowish grey colour: on the upper part of the last joint of the body is a horn-like process, as in many of the Sphinges. It feeds, as every one knows, on the leaves of the white Mulberry, in defect of which may be substituted the black Mulberry, and even, in some instances, the Lettuce and a few other plants. The Silkworm remains in its larva state about six weeks, changing its skin four times during that period, and, like other caterpillars, abstaining from food for some time before each change. When full grown the animal entirely ceases to feed, and begins to form itself a loose envelopement of silken fibres in some convenient spot which it has chosen for that purpose, and afterwards proceeds to enwrap itself in a much closer covering, forming an oval yellow silken case or ball about the size of a pigeon's egg, in which it changes to a chrysalis, and after lying thus inclosed for the space of about fifteen days, gives birth to the Moth. This however is always carefully prevented when the animals are reared for the purpose of commerce, the Moth greatly injuring the silk of the ball by discharging a quantity of coloured fluid before it leaves the cell: the silk-balls are therefore exposed to such a



Phalæna Mori or Silkworm

in its various states.

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degree of heat as to kill the inclosed chrysalides; a few only being saved for the breed of the following year. The Moth, when hatched, is a very short-lived animal; breeding soon after its exclusion, and when the females have laid their eggs, they, as well as the males, survive but a very short time.

The length of the silken fibre or thread drawn by the silkworm in forming his ball, is computed by Mons[r]. Isnard, a French author, who wrote on the subject of the Silkworm in the seventeenth century, to be six English miles in length. This computation however appears to be a greatly exaggerated one. The length indeed may be supposed to differ considerably in different silk-balls, but in general will be found far short of what is stated by Isnard. According to Boyle, as quoted by Derham, a lady, on making the experiment, found the length of a ball to be considerably more than three hundred yards, though the weight was only two grains and a half. The Abbe La Pluche informs us that of two balls one measured nine hundred and twenty-four feet, and the other nine hundred and thirty. It may be proper to add, that the silk throughout its whole length is double, or composed of two conjoined or agglutinated filaments*.

The general history of the manufacture of Silk

* In the Encyclopædia Britannica we are informed that the length varies in different coccoons from 200 to 1200 ells, and that in general we may calculate the production of a coccoon from 500 to 600 ells in length.

may be found in the Cyclopædia of Mr. Chambers and many other similar publications, and is nearly as follows.

The art of manufacturing Silk is said to have been first invented in the island of Cos, by a woman of the name of *Pamphilis* the daughter of Platis. The discovery was not long unknown to the Romans. Silk was brought to them from Serica, where the insect itself was a native; but so far were they from profiting by the discovery, that they could not be induced to believe so fine a thread to be the work of an insect, and formed many chimerical conjectures of their own on the subject. Silk was a very scarce article among them for many ages: it was even sold weight for weight with gold; insomuch that Vopiscus informs us that the Emperor Aurelian, who died A. D. 275, refused the Empress his wife a robe of silk, which she earnestly solicited, merely on account of its dearness. Others however, with greater probability, assert that it was known at Rome so early as the reign of Tiberius, about A. D. 17. Galen, who lived about the year of our Lord 173, speaks of the rarity of Silk, being no where then but at Rome, and there only among the rich. Heliogabalus the Emperor, who died A. D. 220, is said by some to have been the first person that wore a holosericum, i. e. a garment entirely of silk. The Greeks of the army of Alexander the Great are said to have been the first who brought wrought silk from Persia into Greece, about 323 years before Christ; but the manufacture of it was

first confined to Berytus and Tyre in Phœnicia, whence it was dispersed over the West. At length two monks, coming from the Indies to Constantinople, in 555, under the encouragement of the Emperor Justinian, brought with them great quantities of Silkworms, with instructions for hatching the eggs, rearing and feeding the worms, and drawing, spinning, and working the Silk. Upon this, manufactures were set up at Athens, Thebes, and Corinth. The Venetians, soon after this time commencing a commerce with the Greek Empire, supplied all the Western parts of Europe with silks for many centuries; though several kinds of modern silk manufactures were unknown in those times, such as Damasks, Velvets, Satins, &c. About the year 1130, Roger the second, King of Sicily, established a silk manufacture at Palermo, and another in Calabria, managed by workmen who were a part of the plunder brought from Athens, Corinth, &c. whereof that prince made a conquest in his expedition to the Holy Land. By degrees, adds Mezeray, the rest of Italy, as well as Spain, learned from the Sicilians and Calabrians the management of Silkworms, and the working of Silk; and at length the French acquired it, by right of neighbourhood, a little before the reign of Francis the first, and began to imitate them. Thuanus indeed, in contradiction to most other writers, makes the manufacture of Silk to be introduced into Sicily two hundred years later, by Robert the Wise, King of Sicily, and Count of Provence.

It appears by the 33d. of Henry 6th. cap. 5,

that there was a company of Silk-Women in England so early as the year 1455; but these were probably employed in needle-works of silk and thread; and we find that various sorts of small haberdashery of Silk were manufactured here in 1482; but Italy supplied England and all other parts with the broad manufacture till the year 1489. In Spain indeed the culture and manufacture of silk seem to have been introduced at an early period by the Moors, particularly in Murcia, Cordova, and Granada. The silk-manufacturers of this last town were very flourishing when it was taken by Ferdinand, &c. at the close of the fifteenth century. In 1521, the French, being supplied with workmen from Milan, commenced a silk manufacture; but it was long after this time before they could obtain raw silk from the worms, and even in the year 1547 silk was scarce and dear in France, and King Henry the second is said to have been the first in that country who wore a pair of silk knit stockings; though the invention originally came from Spain, whence silk stockings were brought over to Henry the eighth, and Edward the sixth. After the civil wars in France, the plantation of Mulberry-trees was greatly encouraged by King Henry the fourth and his successors, and the produce of silk in France is at this day very considerable. The great advantage which the new manufacture afforded, made our James the first very earnest for its introduction into England; and accordingly it was recommended several times from the throne, and in the

most earnest terms, particularly in the year 1608, to plant mulberry-trees for the propagation of silkworms, but unhappily without effect; though from various experiments, recorded in the Philosophical Transactions, &c. it appears that the silkworm thrives and works as well in England as in any other part of Europe. It should not here be omitted that James the first, while King of Scotland, is said to have once written to the Earl of Mar, one of his friends, to borrow a pair of silk stockings, in order to appear with becoming dignity before the English Ambassador; concluding his epistle with these words; "for ye would not, sure, that your King should appear like a scrub before strangers." This shews the great rarity of silk articles at that period in Scotland; and we are told that our own Queen Elizabeth was presented by her silk-woman Mrs. Montague, with a pair of black silk stockings, with which her Majesty was so captivated that she resolved in future to wear no other stockings than silk ones.

Towards the end of James the first's reign, viz. about 1620, the broad silk-manufacture was introduced into this country, and prosecuted with great vigour and advantage. In 1629 the silk-manufacture was become so considerable in London, that the silk throwsters of the city and parts adjacent were incorporated, under the names of Master, Wardens, &c. of the Silk-Throwsters, and in 1661 this company employed above forty thousand persons. The revocation of the edict of Nantes,

in 1685, contributed in a great degree to promote the silk manufacture in England, as did also the invention of the silk throwing machine at Derby in 1719. So high in reputation was the English silk-manufacture, that even in Italy, according to Keysler (trav. vol. 1. p. 289.) the English silks bore a higher price than the Italian.

In the next division, or *Noctuæ*, stands the beautiful *Phalæna Nupta*, a moderately large species, with the upper wings of a fine grey colour, elegantly clouded and varied with shades and lines of dark brown, &c. and the under wings of a vivid crimson, with two broad transverse black bars: the body is grey, but white underneath. The caterpillar, which is of a pale, flesh-coloured grey, is distinguished by a dorsal tubercle on the fore part of the body, and feeds chiefly on the willow: it changes to a chrysalis in July? and the Moth appears in August and September. The division *Noctuæ*, like that of *Bombyx*, is extremely numerous.

As an example of the *Geometræ* we may adduce a very elegant moth often seen towards the middle of summer on the Elder, and called *Phalæna sambucaria:* it is moderately large, of a pale sulphur-colour, with angular wings, marked by a narrow transverse brown line or streak. It proceeds from a green caterpillar, which like those of the rest of this section, walks in a peculiar manner; viz. by raising up the body at each progressive movement into the form of an arch or loop, the extre-

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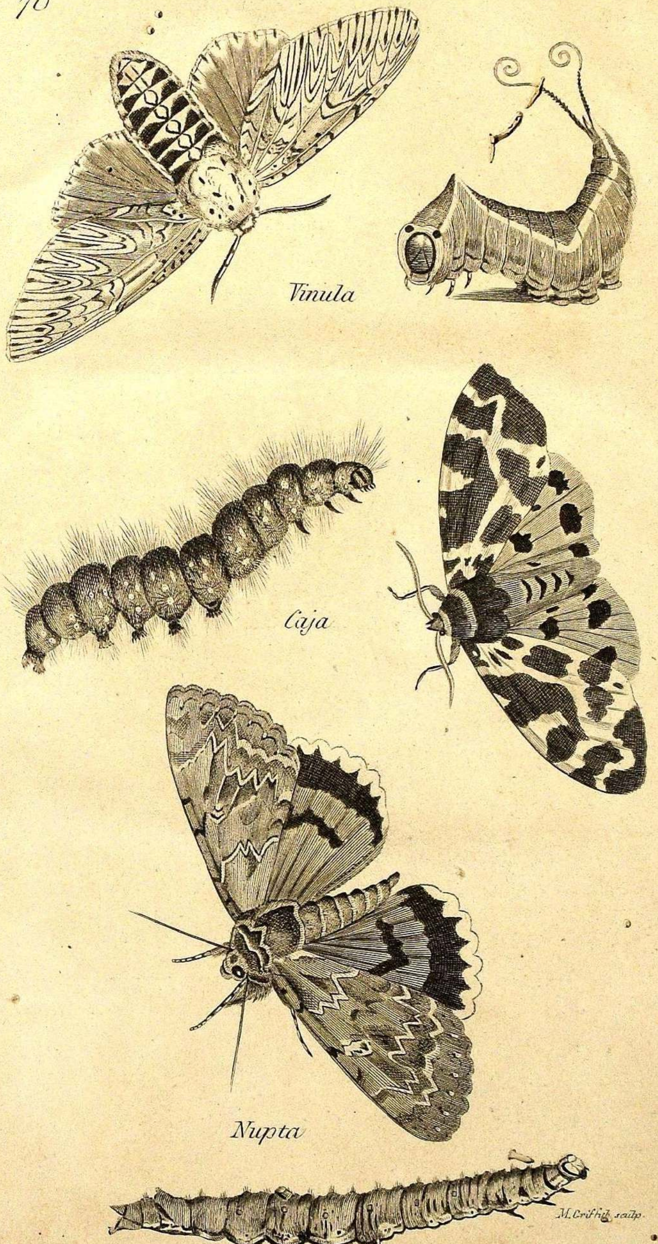

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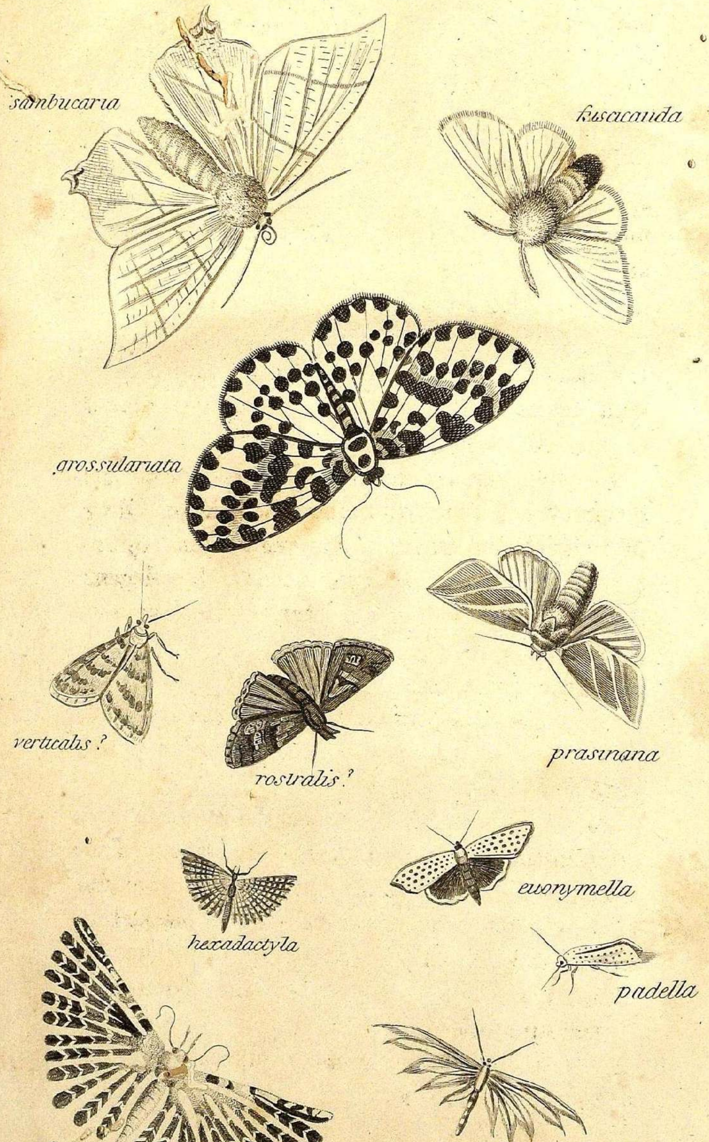

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mities nearly approaching each other. It changes in May and June into a black chrysalis, out of which in June or July proceeds the Moth.

To this division also belongs that beautiful insect called the Currant-Bush Moth, or *Phalæna grossulariata*, so frequently seen in gardens in the month of July. It has somewhat the appearance of a butterfly, with rounded white wings, marked by numerous black spots; the upper pair being still farther decorated by a pair of deep yellow bands: the body also is of a deep golden yellow with black spots: the caterpillar is of similar colour, and the chrysalis black.

In the division *Tortrices*, so named from the faculty which their caterpillars possess of rolling or twisting the leaves of the vegetables they inhabit into a tubular form, stands the elegant *Phalæna prasinana*, an inhabitant of the Oak, and sometimes of the Alder: the upper wings are of a fine green, with two oblique yellow stripes; the lower wings pale or whitish. The caterpillar is of a yellowish green, with white specks, and the end of the body orange-coloured.

In the division *Pyrales* stands the *Phalæna farinalis*, distinguished by the polished surface of its wings, which have a large glaucous-brown middle area or patch, while the remainder is marked by whitish streaks: this insect, when sitting, has an obtusely triangular outline, and the abdomen is turned up at the tip.

The division called *Tineæ* comprehends those moths which are, in general, of a small size, though

often of very elegant colours. Of this tribe is the *Phalæna Padella:* it is of a pearly white colour, with very numerous black spots: its caterpillar is gregarious, appearing in great quantities on various sorts of fruit-trees during the decline of summer, and committing great ravages on the leaves: these caterpillars inhabit a common web, and usually move in large groupes together: their colour is a pale greyish yellow, with numerous black spots: each caterpillar at the time of its change to chrysalis, envelops itself in a distinct oval web with pointed extremities, and many of these are stationed close to each other, hanging, in a perpendicular direction from the internal roof of the general enclosing web: the chrysalis is blackish, and the moth appears in the month of September.

To this division also belong the Moths emphatically so called, or *Cloth-Moths*. Of these the principal is the *Phalæna vestianella*, which, in its caterpillar state, is very destructive to woollen cloths, the substance of which it devours, forming for itself a tubular case with open extremities, and generally approaching to the colour of the cloth on which it is nourished. This mischievous species changes into a chrysalis in April, and the moth, which is universally known, appears chiefly in May and June.

In the last division, called *Alucitæ*, is one of the most elegant of the Insect Tribe, though not distinguished either by large size or lively colours. It is a small moth, of a snowy whiteness, and, at first view, catches the attention of the observer by